ROADS and STREETS

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HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

A GILLETTE PUBLICATION

Gillette Publishing Co., 22 West Maple St., Chicago 10, Illinois • Accepted as Controlled Circulation Publication at Milwaukee, Wis.

Stripping contractor turns to highway grading (see page 28) . . . Details of that big Utah blast . . . Dump-body concrete delivery for third-laning under traffic . . . 75 mile asphalt street program for small city . . . Selecting the right pile driver.

September 1957

Fix a big mix...

Rex 6½ yard Moto-Mixer is built for peak efficiency by CHAIN Belt Company. Exclusive drum blade design provides improved mixing action, fast discharge. Rear mounted engine and transmission places center of gravity nearer the front axle for better weight distribution, maximum payload. Rugged Chrysler Power —available with gýrol fluid coupling—assures low cost, trouble-free operation at all times.

CHRYSLER INDUSTRIAL 30
in-line 6 Engine (230 cu. in. displacement) powers Rex Moto-Mixer—and many other makes of equipment in the construction and materials handling field. There are four Chrysler in-line 6s, two V-8s —ranging from 230 to 354 cu. in. displacement.

Chrysler
INDUSTRIAL ENGINES
INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

Write Dept. G-9, Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan, or see your nearest Chrysler Industrial Engine Dealer.

☐ For specific detailed information ☐ For descriptive literature

NAME

ADDRESS

CITY ZONE STATE

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Long lengths of BETH-CU-LOY speed up installation

One of the beauties of using light-weight drainage pipe made of Beth-Cu-Loy sheets is the long lengths that can be used. By way of example, a 14-ft section of 18-in. diameter pipe made of 16-ga Beth-Cu-Loy weighs but 214 lb, which means that it can be unloaded and placed in the trench without the use of mechanical hoisting equipment. As a matter of fact two men should be able to do the job.

From this it can easily be seen that still larger diameters in still heavier gages can be handled with only the simplest of lifting machinery. And, of course, the long lengths of the sections reduce the number of field joints, and enable the pipe-laying crew to keep right up with the trench diggers. Beth-Cu-Loy field joints are, themselves, a simple and time-saving operation which affords additional economies.

Light though it is, pipe made of Beth-Cu-Loy has the great strength of steel, and the corrosion-resistance of zinc. It is flexible enough to "give" with the fill and help distribute the load around its own periphery. It conforms well to grade and alignment and absorbs impact, vibration and the shifting effect of weather changes.

Beth-Cu-Loy sheets meet the rigid specs of the American Association of State Highway Officials. If you would like further details about Beth-Cu-Loy sheets for drainage pipe, just get in touch with any Bethlehem sales office, or with one of the fabricators using our culvert sheet stock.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

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ROADS AND STREETS

A GILLETTE PUBLICATION • SEPTEMBER, 1957 • VOLUME 100 • NUMBER 9

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Interstate Projects

What is the new pattern of jobs developing as the Interstate program gets rolling? Projects of outstanding interest to contractors and engineers will be reviewed including relocations in Pennsylvania, Wyoming, New Mexico and other states.

Rock Excavation Methods

The above project reviews and others will continue the series on rock excavation methods. A special report will discuss experiences and results with tractor-mounted and other heavy drills.

Also Coming Soon

How one contractor batch-hauled for 2,300,000 square yards of concrete paving . . . Producing seven aggregate grades simultaneously at 450 tons per hour . . . The World Conference on Prestressed Concrete, and examples of recent prestressed bridge construction . . . Case report on use of a controlled surcharge fill to accelerate embankment settlement . . . Notes on flexible bituminous road methods in a midwestern state.

Accepted as Controlled Circulation Publication at Milwaukee, Wisconsin. Published monthly. Subscription $5.00 per year.

ROAD-BUILDING VETERAN PROVES

BEST EQUIPMENT, WELL MAINTAINED, PAYS OFF BEST

▲ MILLION-DOLLAR ARRAY of equipment like this takes $7,000,000 relocation job on U. S. 21 in stride. This is just one of the many highway and airport grading and paving projects in Frank Mashuda Company's long and successful history. Tires shown are wide-base Hard Rock Lug by Goodyear.

◀ TYPICAL ON-JOB SETUP includes huge Quonset maintenance center and 2-way radio facilities. All vehicles and tires are kept in A-1 working condition at all times, on every job—and when no longer needed are returned to central maintenance center for general inspection and reconditioning. This has paid off, through the years, in one of the lowest down-time overheads in the industry.

80% of earth-mover tire down time ended by Goodyear

Other 3-T Nylon Cord Tires—
Tubeless or Tube-Type!

ALL-WEATHER EARTHMOVER

HARD ROCK LUG

HARD ROCK RIB

SURE-GRIP LUG

ROAD LUG

GOODYEAR TIRES

Look for this nearby Goodyear dealer sign for better tire values—better tire care.

3-T Cord TUBELESS!

CONTRACTORS REPORT that as much as 80% of tire down time is due to tube and flap troubles.

Goodyear TUBELESS tires and rims end all that—end high cost of tube replacement—and give you other important advantages:

Goodyear tubeless assemblies are *tops* in dependability, *tops* in easy mounting, save weight and run cooler. You often discover tire injuries *before* they become serious, repairs are simpler and can frequently be made *without removing tire!* As a result, tire failures hit all-time LOWS!

Be sure you specify GOODYEAR triple-tempered TRIPLE-TOUGH 3-T CORD TUBELESS for every size new equipment—and see GOODYEAR dealers for change-over of present vehicles.

Goodyear, Truck Tire Dept., Akron 16, Ohio.

Buy and Specify

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

All-Weather, Road Lug, Sure-Grip—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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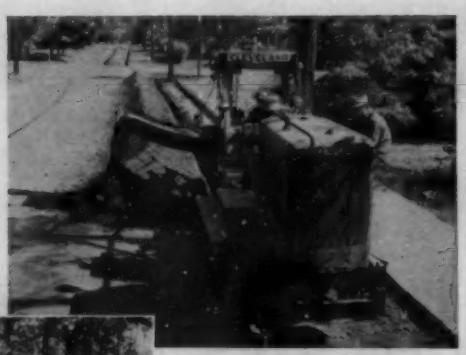
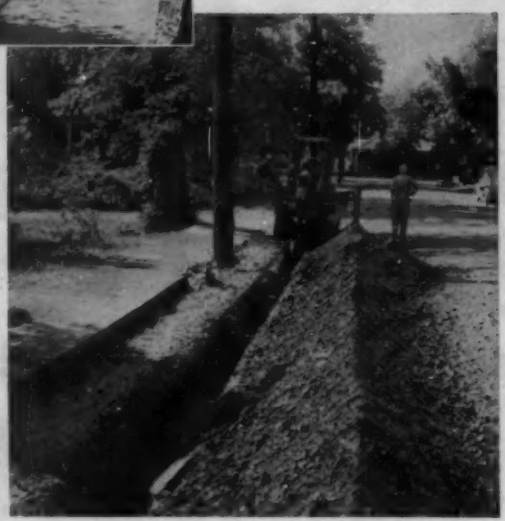


DIGS CLOSE

DIGS FAST



Etowah Construction Company uses its Cleveland 95's compactness and shiftable conveyor to advantage on this utilities job in Franklin, Tennessee.

The Cleveland 95 "Baby Digger"—built by the Pioneers of the Modern Trencher, originators of *every* important trencher design feature—makes money for its owners because it . . .

- ***fits more jobs***—digs to 5½' deep x 24" wide.
- ***digs all soils***—full-size engine, over 30 graduated power and speed combinations.
- ***digs faster***—more bucket capacity, more wheel-and-crawler combinations.
- ***saves property damage***—full crawlers, easy on lawns and sidewalks.
- ***lasts longer***—quality construction and materials mean longer life—it's in the records.

THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

Good Everywhere

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ROADS AND STREETS

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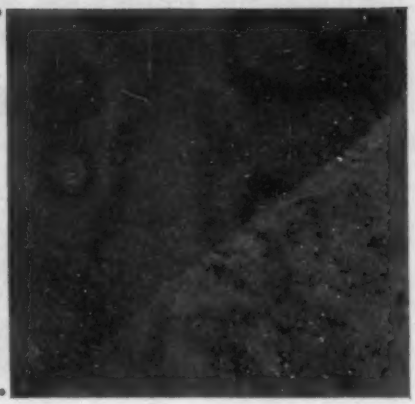
How do rubber alloys answer the major seal coat problem?

80% more stone retained—that's the story on this direct comparison. In both photographs, the ordinary seal coat is on the right and the one made with RUBARITE/asphalt alloy is on the left. The seal coats were laid in borderline weather—ambient temperature of 55°-60° F. Photos were taken three weeks after laying and the same relative difference can be noted today—*almost three years later.*



WE think the photographs reproduced here tell the story very well. Excessive cover stone loss is the big problem with seal coats. And as you can see, asphalt cement, or cut-back, retains as much as 80% more stone when alloyed with RUBARITE.

RUBARITE is a powder of unvulcanized synthetic rubber combined with minute particles of a special carrier. This unique combination assures its easy handling, rapid mixing and thorough dispersion in the asphalt.

The action of RUBARITE in asphalt is to form a weblike structure which reinforces the bitumen. The net results are substantially increased adhesion, reduced susceptibility to heat, cold and oxidation plus improved toughness, flexibility and ductility.

In terms of seal coats, the alloying of asphalt with RUBARITE means a higher early strength and a much longer adhesive life. It also means construction in borderline weather, less concern for delays in placing the stone, mats up to twice the usual thickness, an earlier return of traffic plus the demonstrated high stone retention on a long-term basis.

Now, we don't hesitate to tell you that adding RUBARITE to a seal coat binder adds to its original cost. Neither do we hesitate to predict that the extra pennies per square yard will be returned, several times over, through less loss of stone and upwards of *twice the life* of nonrubberized coats. And we have the facts to back up our prediction. Why not get them, today? Just write to: Rubarite, The Goodyear Tire & Rubber Company, Akron 16, Ohio.

RUBARITE BY

GOODYEAR

THE GREATEST NAME IN RUBBER

Rubarite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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Panoramic photo shows over-all magnitude of the Pittsburgh Disposal Plant Project and the tremendous task force of equipment needed to carry it out. Principal lubricants used are *Texaco Ursa Oil Heavy Duty* for all

"We're out to earn a bonus on a $100,000,000 project...

"and that means every piece of construction equipment must deliver its full share without down-time. That's why we set up a special Texaco Lubrication Plan right at the start," says *Maintenance Supervisor J. B. Metz of McHugh-Allegheny-Drake Contractors.*

Prior planning has paid off for McHugh-Allegheny-Drake. Maintenance Supervisor Metz reports wonderful results:

"The equipment works in damp, steamy excavations, breathes churning dust, pounds its bearings unmercifully, and still delivers top-rate performance. Down-time is limited to routine maintenance, thanks to the excellent Lube Plan of the Texaco Lubrication Engineer."

TEXACO

TEXACO

engine lubrication; *Texaco Marfak Heavy Duty 2* for wheel bearings and general grease lubrication; *Texaco Regal Oil R&O* for air compressors; and *Texaco Meropa Lubricant* for transmissions and differentials.

KING-SIZE PUMP WELL . . .

Since last year, the construction equipment of the McHugh-Allegheny-Drake contracting company has been digging what amounts to the biggest ever dug.

The Pumping Station excavation will handle all the sewage to be received in Pittsburgh's new $17,000,000.00 Sewage Treatment Plant. Two more years will be needed to finish the job.

Even before it began the job, the firm asked to "see a Texaco Lubrication Engineer," who helped draw up a Lubrication Plan covering the entire job. Not only manufacturers' lubrication charts were considered. Weather, terrain, work loads, garaging were all weighed together before the proper Lubrication Plan was chosen. The Plan's lubricants are delivered locally from one of Texaco's 2,000 Distributing Plants.

SHOULD *YOU* CALL THE TEXACO LUBRICATION ENGINEER?

Before you do, you might want to know what he does:

1. He surveys your equipment and conditions. (Working conditions are important.)
2. He recommends specialized Texaco lubricants to meet the specific requirements of the job. (His choice may differ from yours—*ask him why!)*
3. He arranges local stocks for the items you'll need, to keep your costs low, your service routine.
4. He watches the progress of your Lubrication Plan, and adjusts it to changing conditions.

HOW CAN YOU GET IN TOUCH WITH HIM?

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States—or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

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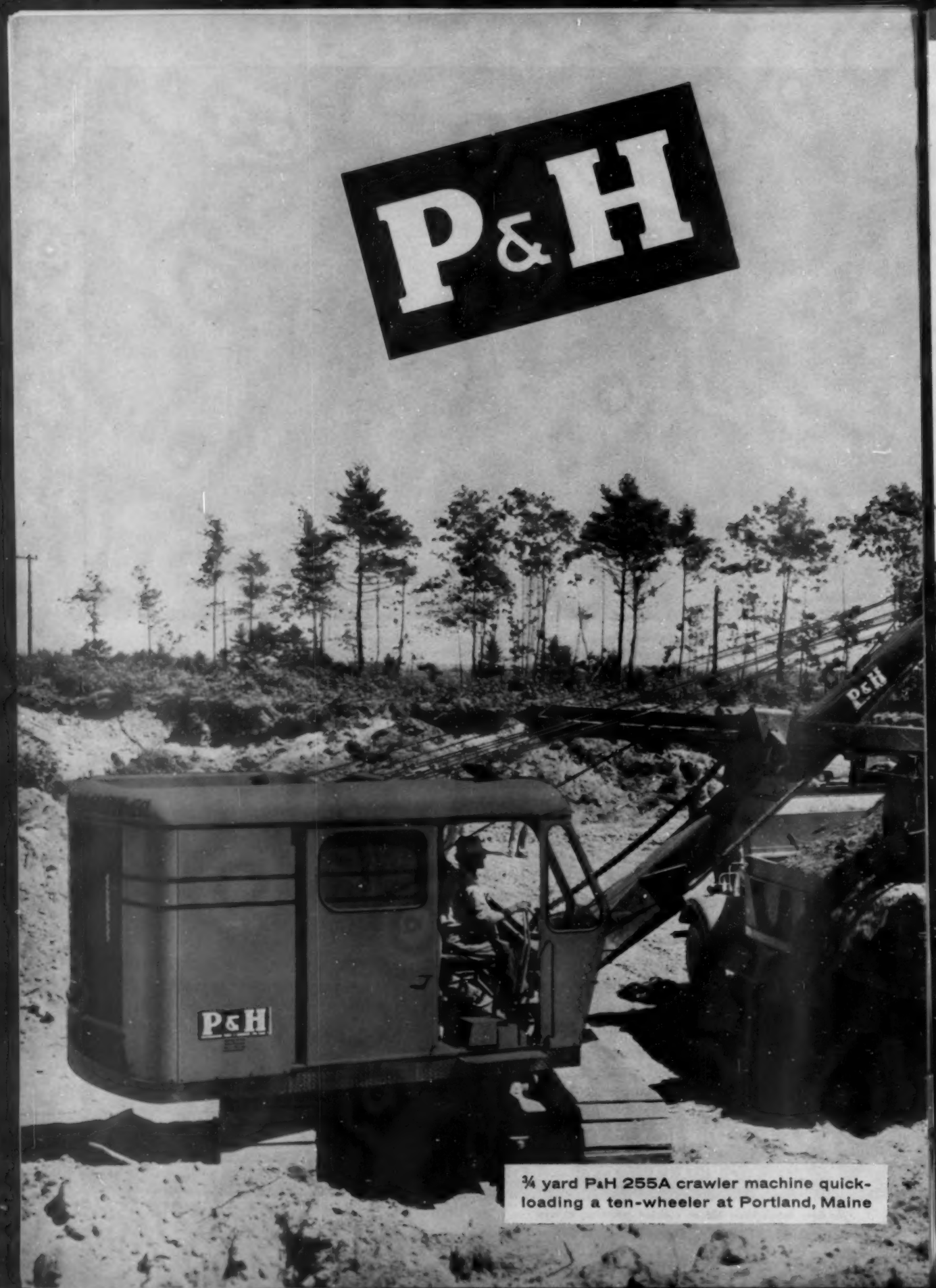


¾ yard P&H 255A crawler machine quick-loading a ten-wheeler at Portland, Maine

3/4 yd. shovel has a mighty appetite

P&H 255A–first ¾ yd. power shovel--still the leader

P&H was first to introduce a ¾ yard shovel with internal combustion engine and today the P&H 255A *continues* to lead in profitable performance.

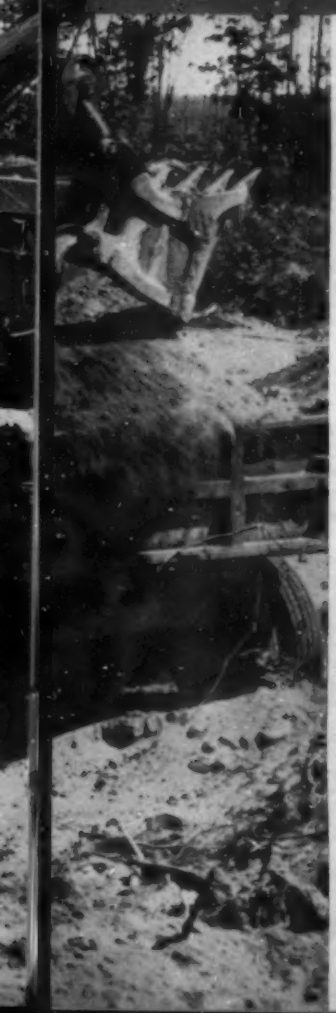
Contractors agree that the 255A with its dependable day-in and day-out production can dig more and lift more—faster and cheaper. In fact, many contractors agree that performance of P&H equipment is the big factor in determining their profits.

P&H profitable performance comes from a combination of features that are found only in P&H quality equipment. In the 255A you get famous P&H stability through better weight distribution and a low vertical center of gravity. You get smooth, fast, lively swings on the mammoth P&H live roller circle. P&H designed double adjustable hook rollers assure "even keel" swings. The 255A makes maximum use of alloy steel.

Add to these features the fact that equipped with a P&H Diesel Engine with its greater torque you'll get much greater production than with a gas engine. Yes!—this ¾ yard excavator has the mightiest appetite for work—at a potential profit.

Harnischfeger Corporation
Construction & Mining Division
Milwaukee 46, Wisconsin

THE P&H LINE Truck Cranes: 8, 10, 15, 20, 25, 30, 35 and 45 tons
Shovels: ½, ¾, 1½, 1¼, 2½, and 3½ yards



Across the country P&H machines lead the field in power, speed, flexibility, and profitable performance

CALIFORNIA
For handling loads up to 35 tons profitably there is the P&H 555A-TC. Here are Reliance Equipment's two 555A-TC units double lifting a precast concrete panel in the Vail Field Industrial Area, Los Angeles.

LOUISIANA
In the 1½ yard class, Schwartz Supply Co. profits from the lively swings and dependable performance of the P&H 655B. It is shown unloading material for their concrete mixing plant near New Orleans airport.

OHIO
Beavercreek Excavating Co. of Dayton depends on their ½-yard P&H 155A trench hoe to dig water mains and lay pipe economically and at a profit on State Highway 4 project in Butler County.

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Write today For Bulletin X-71 On the P&H 255A Fully Convertible Crawler Machine

Harnischfeger Export Corporation, Dept. 509
Construction & Mining Division
Milwaukee 46, Wisconsin, U.S.A.

Gentlemen:
Please send me Bulletin X-71 on the ¾ yard P&H 255A.

Name .....

Title .....

Firm .....

Street .....

City ..... *Zone*..... *State*.....

Here's your answer to close bids and high costs:

Multiply your job range.....
Divide your rig investment..

Instead of sinking your capital in an old-fashioned "single-action" loader, let the same money buy four big-capacity International Drott 4-In-1 machine actions!

Instead of allowing profits to dwindle because an ordinary tractor-loader can't do 'dozer, scraper, or clamshell work, change to a 4-In-1! Move the machine-selector lever, right from the comfortable foam rubber seat, and watch your job-getting, profit-building potential go up and up!

You aren't getting just "another bucket"—but famous and exclusive Skid-Shovel® rock-busting, pry-action break-out. And 41° bucket-heaping, ground-level roll-back. It's the one and only true pry-action! That means full hydraulic power transfer—correct pry-lever length—and exclusive frame-mounted skid-shoes to provide the vital fixed fulcrum!

And you're also getting easily-controlled, earth-rolling bulldozer action. Plus "carry-type scraper" action to grade, strip, or spread with inch-close accuracy. Plus super-speedy clamshell action, with bottom-dumping to eliminate the sticky materials problem. Plus the exclusive performance protection of shock-swallowing Hydro-Spring!

Invest only 15 concrete-smashing, earth-rolling, load-gulping, sod-stripping minutes! Prove to yourself that an International Drott 4-In-1 multiplies your job range, and divides your investment, by four! Prove you can't afford to handicap your future with any limited-duty rig—when you can command this versatility unlimited. See your International Drott Distributor for a 4-In-1 demonstration.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

INTERNATIONAL® DROTT®

"Our International Drott 4-In-1 is a fine 'dozer—for stripping and pushing rock into the crusher hopper," reports Animas Valley Sand & Gravel Co., Durango, Colorado. "Besides, this machine is a better loader than those used before. And heavy lifting is easy with its clamshell."

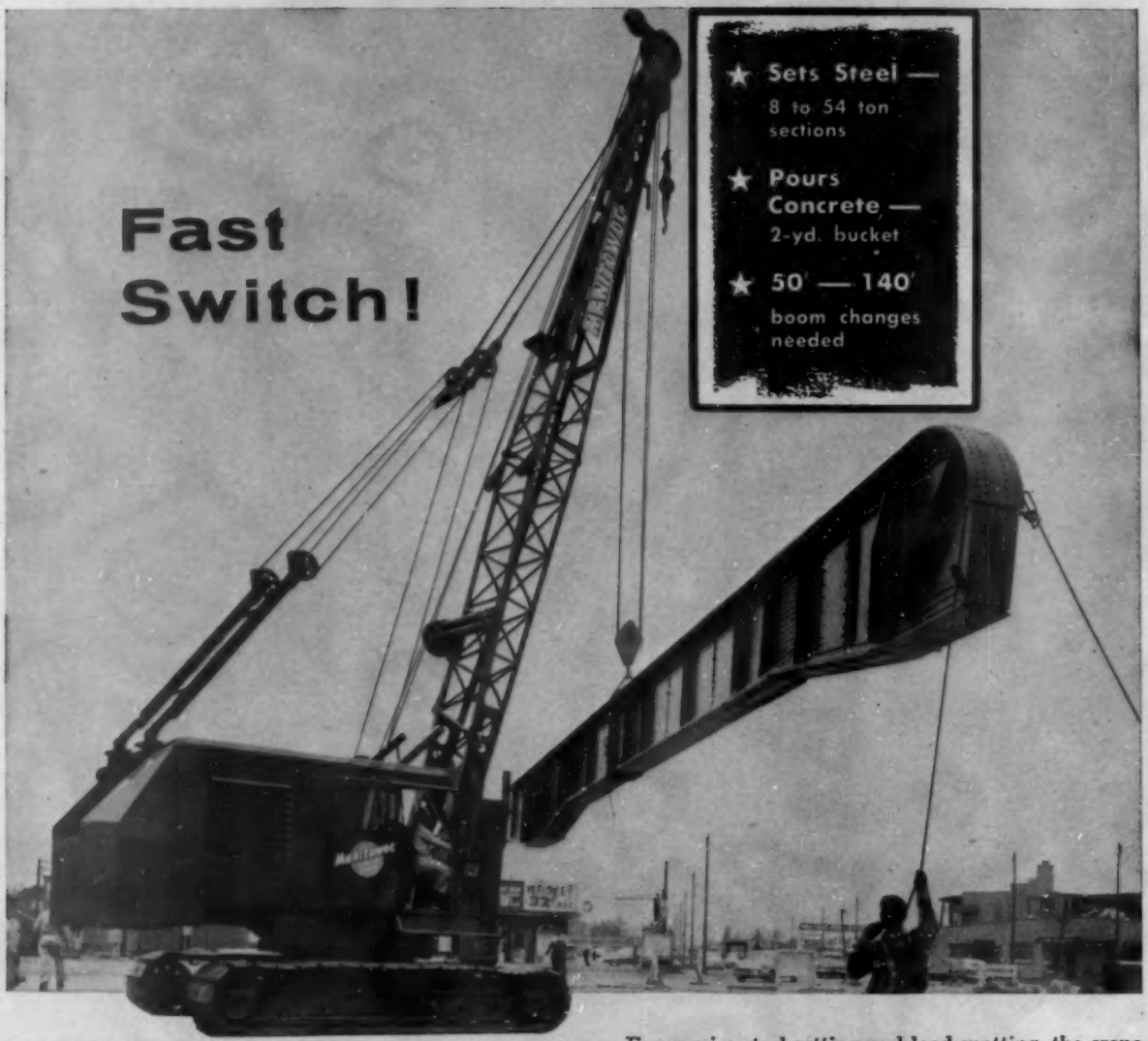
Using 4-In-1 "carry-type scraper" action to fill the bucket on the go—a special advantage in depth-controlled grading or recovering and loading layered materials. "No limit to 4-In-1 versatility of operation," reports Stehle Equipment, Inc., Annapolis, Maryland—owner of the TD-14 4-In-1 shown.

....by FOUR
..by FOUR!

Doubling for dynamite, this 4-In-1 is digging and loading "unshot" sandstone material for binder and fill. Holland and Woodward Stone-Gravel Trucking Co., Decatur, Alabama, reports this material formerly had to be "shot"—before previously-used equipment could handle it!

One-gulp bucket fill of 4-In-1 as a clamshell permits picking up and loading, with ease, old tires, tree stumps, and similar "impossible" materials. Stockpile loading, too, is simplified with this "stand-and-fill" action. And the bottom-dumping clamshell gives a 2½-foot dumping height advantage over ordinary roll-forward buckets.

Equipped with Rock Fork instead of 4-In-1 bucket, this TD-14 is loading rock for rip-rap on a dam near Jacksonville, Texas. Bull-angledozer, wood-handling Skid-Grapples, Grubber Blade, and Bulldozer are other attachments that multiply International Drott usefulness!



There's a real "quick change artist" geting many jobs done fast on Chicago's Calumet Skyway project. This versatile performer is a Manitowoc Model 3500 60-ton crane operated by Arcole-Midwest Corporation of Skokie, Ill. — Arnold Kincaid, Supt. of Equipment. Equipped with a 50′ boom, the crane sets 8-ton longitudinal and 54-ton support girders for the elevated structure. A quick change to an 80′ boom with a 15′ jib or a 140′ boom, and the rig is ready for high lift concrete pouring with a 2-yd. bucket.

"The Manitowoc 3500 has demonstrated its versatility in multiple use over the long haul," says Arcole-Midwest operator Frank Dauksch. "Its combined advantages of quick interchangeability of lines and booms, plus completely dependable operation make it the ideal single unit for a job with many aspects such as ours. Boom changes of 50′ to 140′ can be made without touching the removable counterweight—there's no downtime resulting from laboriously hauling and adding counterbalance weights. With proper steel schedules, we could easily set up 500 tons per day — enough to complete this job in a week's time."

Boom length changes are simple. Both flanges and pendant lines fit together quickly without tediously re-reeving cable every time. Using only three men, Arcole-Midwest can add another boom segment in just two hours, with a 30% labor cost saving over previous machines used.

For precise steel setting and load spotting, the crane has both manual control — where "feel" of the load is essential — and air control to eliminate operator fatigue. Disc-type clutches assure smooth performance without grabbing and dangerous load swing.

"The mobility of the Model 3500 from job to job is higher than any other machine I have worked with," says Dauksch. "The rig can remove its own track assembly for flat car loading — the only crane to my knowledge that can do this. With our Manitowoc, we can load for shipment without bringing in another crane on the job, saving over $300 in rental cost. On the whole, this Manitowoc is the smoothest working machine made, with many practical refinements that make is *vastly superior* to any other crane we've used."

You can have profit-making versatility like this on *your* next job. Call your helpful Manitowoc distributor now for all the facts!

Manitowoc Engineering Corp., Manitowoc, Wis.

SHOVELS
1—5½ YD.

Manitowoc

CRANES
20—100 TON

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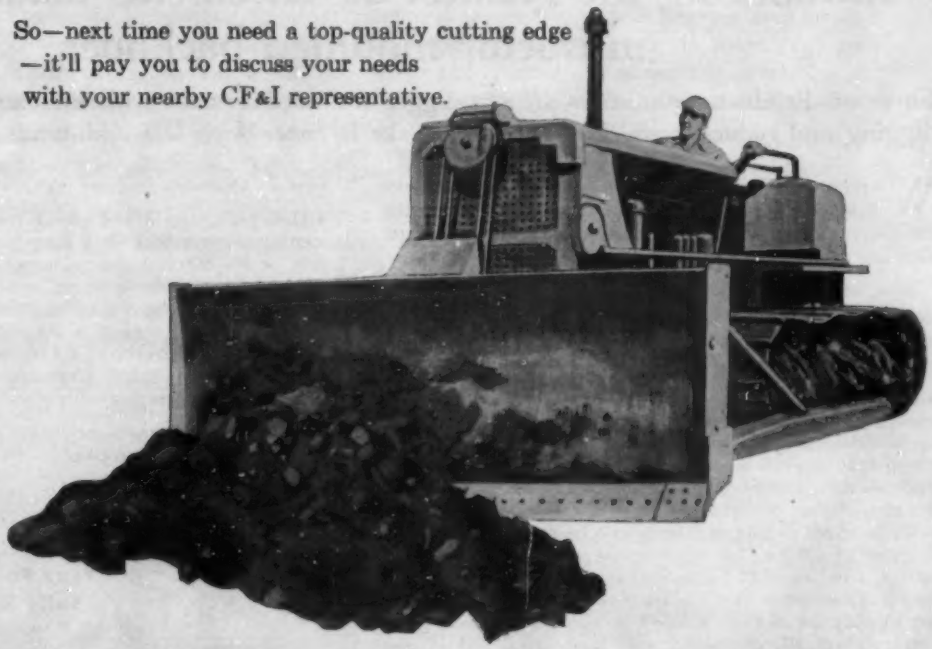
CF&I CUTTING EDGES

for building superhighways . . .

. . . or any other type of tough earth-moving job, you'll find that CF&I Cutting Edges are ideal.

For CF&I makes a full line of cutting edges for every type of earth-moving equipment—cutting edges that are tough enough to give long service no matter how tough the terrain. CF&I Cutting Edges are available in a wide variety of lengths, widths, thicknesses and hole spacings; flat or curved; with beveled or square ends.

So—next time you need a top-quality cutting edge —it'll pay you to discuss your needs with your nearby CF&I representative.



CF&I CUTTING EDGES
THE COLORADO FUEL AND IRON CORPORATION

5093

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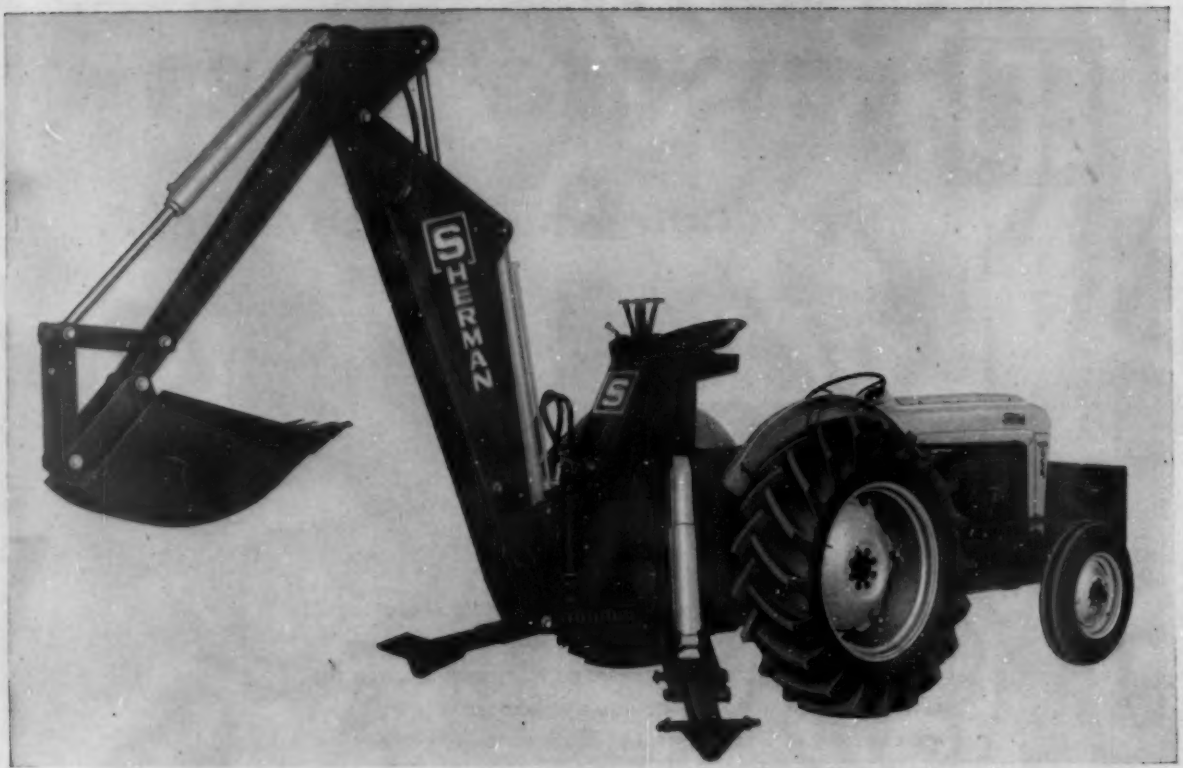

Introducing the greatest advancements made to date in tractor mounted backhoes

Sherman Products announces *all new* digger for Ford Tractor with increased output to speed digging and reduce costs. New features make it faster with less maintenance and longer life.

WHAT you are really buying when you purchase a backhoe is not a group of parts but the capacity to dig holes at the lowest possible cost. This means you need a fast digger with low maintenance expense.

Now, Sherman presents an *all new* power digger that meets these requirements! It is faster, will outlast and requires less maintenance than any comparable backhoe.

Here are the reasons why it is faster:

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ROADS AND STREETS
Sixty-Five Years of Editorial Leadership

Washington News Letter

By Duane L. Cronk September 10, 1957

Credit needs of the highway industry to meet the expanded roadbuilding program have just been released by the American Road Builders Association. ARBA believes that in spite of the tight money situation, highway construction will not be deterred.

The ability of contractors to bid on work is markedly affected, however, ARBA declares, by their supply of working capital. The implication is that if a state highway department wants the most contractors possible bidding on future jobs, it should do what it can to make it financially possible for them to come back into the picture. That means retaining less money and making quicker payments for work completed. Here are some of the practices ARBA would like to see highway officials adopt to bring money earned by contractors into their pockets faster:

- Reduce the present 10% ordinarily retained on contract work to a maximum of 10% retained only on the first 50% of work performed under contract.
- Assign enough men within the department to processing of contractor's estimates to assure prompt payments.
- Reduce the regular estimate payment interval from one month to two weeks.
- Schedule lettings to avoid overloading contractor capacity in any period, and plan them at least six months to a year in advance.
- Pay for materials delivered to job site to fullest extent possible.
- Make progress payments on basis of plan quantities, rather than waiting for detailed computing of estimates. Compute final estimates only.

* * *

Contractors make only about 2% profit after taxes, according to ARBA's special Task Force Report. Another 2% of the contract dollar must be set aside by contractors in the higher income brackets for income taxes. This leaves 96% of the contract dollar - (20%) for equipment, (35%) payrolls, (41%) materials and overhead - all of which the contractor must obtain financing for. The national highway Association foresees that as the National Highway Program picks up speed, the ability of contractors to take on as much work as they could easily handle on the job would be limited by their financial resources.

This is a particularly pertinent problem because of prequalification (only 10 highway departments do not prequalify), by which a state insists on the financial ability of low bidder to swing a project before awarding him the contract. Bonding companies, too, scrutinize a contractor's fluid assets closely before approving him for the required bonds.

(continued on next page)

ARBA believes that two obvious ways to keep contractor credit fluid would be to liberalize the retainage practices followed by the state highway departments, and speed up payments for work completed.

"We estimate that if a state retains 10% of the contractor's earnings on a $500,000 job, it ties up a total of $50,000 of his money or an average of $25,000 through the life of the contract. If partial payments are delayed, as they frequently are, by even as much as two weeks, another $20,000 of the contractor's earnings are frozen during the life of the contract."

* * *

A survey of contractor payment practices by the AASHO reveals that:

● Thirty-three departments make progress estimates and payments monthly. Eight pay semi-monthly. Eleven will pay more often if requested or if payment is above a specified amount (varying from $1,000 to $50,000). The average lag between progress estimate and payment to the contractor is 11 days. However, 12 departments pay in seven days or less.

● Thirty-two departments retain 10% of the contractor's earnings on progress reports. One holds 7½% and another 5%. The rest all follow the BPR system of retaining 10% of the first 50% of the job and variable from none thereafter. It is an average of 11 weeks from the time a project is finally inspected and accepted to when the final estimate is paid, although the range was from two to 52 weeks.

● Only 8 departments withhold the full retainage before payment of final estimate. Most departments cut it to 2% to 3%, with some paying all retainage as a semi-final. In only 19 departments is the retainage practice spelled out by law. In all other states, it is determined by state officials. About half the states reported they would be agreeable to holding retainage to 5% for the entire length of construction.

● Twenty-one states indicated they would take advantage of the new federal provision that permits them to request advance federal funds to make prompt payments to contractors for work completed. (Two already have.)

● Thirty-nine states pay for materials delivered to the job before they are incorporated into complete work, although the percentages withheld are variable.

* * *

The Bureau has picked 2,105 miles of toll roads in 15 states for inclusion into the Interstate System. Congress has asked the BPR to designate those highways, both free and toll, which (1) follow the general alignment of the network, and (2) meet the engineering standards of the System. The Bureau has decided to waive the second requirement which would have eliminated several toll roads on relatively minor deficiencies. The Pennsylvania Turnpike is the outstand example. Its median strip is far from wide enough, its lanes and tunnels inadequate for the traffic of 1975 as required in the standards. (It will be 40 years old by then.) But Bureau officials feel they would be more severly criticized if they refused to include these roads and required new construction very nearly paralleling them.

BPR is next required to tell Congress how much it will cost to reimburse the states for the construction of these facilities - as well as the already constructed free roads which are on the network and presumably come up to standards. There will be nearly 5,000 miles in all and enough money involved to make this one of the hottest issues in Congress next January.

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ROADS AND STREETS
Sixty-Five Years of Editorial Leadership

Washington News Letter

THE BIG HIGHWAY PROGRAM - FINALLY UNWINDING

A Special Report - By Duane L. Cronk

Several weeks ago Roads and Streets reviewed the progress of the National Highway Program during its first 10 months. In that newsletter, we described the process by which billions of dollars in the federal-aid "pipeline" are working their way to the contract-letting stage. We pointed out that months of preliminary engineering had to be accomplished and right-of-way acquired before contractors could expect to see a high volume of advertisements and before equipment manufacturers and materials producers could hope to realize a large market.

Now we turn our sights from the fiscal year just past to the present rate of progress and the year ahead. How much of the big money will reach the "dirt-flying" stage within the next 12 months? The answer, of course, lies in how much of the necessary groundwork is being accomplished by state highway departments now.

* * *

There are two stages of the big roadbuilding program in which contractors, equipment manufacturers and materials producers are most interested: (1) Completion of preliminary engineering, and (2) acquisition of right-of-way. Like two streams, both activities flow into contract lettings.

All of the other preliminary stages - in which billions of dollars are still lodged - are relatively incidental. Some may point with pride to huge sums moving through these initial "programming," "obligating," and "authorization" stages, but they require little work on the part of the state highway departments. They represent formalities - what might be called "paperwork progress." (Which explains why, while many Washington sources were applauding "progress" of the National Highway Program in its first year, contractors did not see much additional work and equipment manufacturers actually suffered sales drops.)

What the industry wants to know is how fast the states are moving in production of engineering plans, acquisition of the necessary rights-of-way, and advance scheduling of contract awards. BPR figures reveal "authorizations" for this work, but not progress in engineering and acquisition. And, unfortunately, these activities are proceeding so unevenly throughout the states that it is extremely hard to gauge their pace. However, from the national statistics which are available, from Roads and Streets' own survey of state plans, and from behind-the-scenes developments, some appraisal can be made of the developing market ahead.

* * *

All together, these soundings indicate that roadbuilders can be considerably more optimistic about "Year Two" of the National Highway Program. Here are reasons why the next 12 - even the next six months - look better than those just past:

(continued on next page)

• Contract lettings scheduled by state highway departments for the immediate future are much heavier than in the last six months. In some states, the first Interstate jobs are finally reaching the awarding stage, in others the build-up is continuing at an encouraging rate.

• Highway departments are slowly, but steadily, adopting new engineering methods to tackle the huge location and design task ahead of them.

• Consulting engineers, with their ability to pay higher salaries and attract more men, are picking up the workload in many states and helping to ease many a department through a staff shortage.

• Right-of-way acquisition is still lagging, but is expected to pick up.

• New matching money and badly needed right-of-way authority have been granted in numerous states by legislatures now adjourning.

• Highway departments are being reorganized to strengthen and streamline administration.

* * *

Plan production is picking up. In the first year of the Interstate Program, highway departments produced plans for some $977 million worth of work. In the last two months of that period, however, plan production represented $240 million worth of work, a stride which if kept up will produce plans for about $1,400 million worth of work this year, a 40% increase.

Actual contract awards are rising steadily, too. During the first 13 months of the Interstate program, state highway departments let contracts for projects worth $874 million. Some $283 million of this total has been let in the last three months alone, however, establishing a rate which if continued through the next 12 months will amount to $1,132 million in projects arriving at the construction stage. (Actually, the rate of awarding will pick up so substantially in some states during the next six months that such a projection of early rates would be ultra-conservative. Notice how many states on the following page are apparently moving into high gear.)

Right-of-way acquisition is very slow in getting under way. The Bureau has tentatively OK'd states' plans to expend $541 million for Interstate System project rights-of-way. But final location has been established and acquisition approved on only a fraction of this. New authority just granted by state legislatures is expected to enable many highway departments to break through this bottleneck, however.

* * *

Preliminary engineering is being stepped up. If the rate of plan production described above is to increase, industry leaders are agreed, state highway departments must adopt every engineering shortcut possible. Many are. Twenty states have now acquired or leased high-speed electronic computers, many within the last few months, to process earthwork quantities and handle other engineering computations. These "baby brains" sell from $40,000 to $200,000, are expected to eliminate a great deal of the manual chore now laboriously being done by staff men.

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L. R. Schureman, BPR expert in use of such devices, believes that 40% of the highway engineering chore is in computing work, and much of it can be whittled down by use of the new machines.

The big electronics manufacturers are setting up numerous service centers around the country, to assist highway departments and consultants with their computation load. IBM, for example, has 16 such centers and expects to double that number. They will either train computer technicians to join highway department staffs or will process data themselves. Engineers will be able to bring their raw measurements into a center and come back for the answers in about three days, eliminating months from the traditional practice.

(In addition, the Bureau of Public Roads is encouraging the establishment of a "lending library" from which consultants or departments can borrow the "programs" or formulas already set up for processing data, thus eliminating even some of the electronic computation.)

Aerial photography is being adopted more widely, too, as a speedy method of locating new routes. The method eliminates literally weeks of ground surveying and its more accurate measurements assure contractors of closer earthwork computations. Acceptance of such techniques is spreading. Within the last few weeks alone, South Dakota has let its first contract for aerial photography; ARBA has organized its first committee to study and publicize electronic computation techniques; and the first private consulting firm set up to apply both methods to engineering assignments has been organized in Columbus, Ohio.

* * *

All these developments seen from Washington, and the statistics which roll out of the BPR's totaling machines, portray a general pattern. Out in the states, of course, the pattern disappears. Some are way out front; some are still lagging dismally. That's why readers must keep their eye on their local, not national conditions. A Roads and Streets' swing around the country reveals that finally states "are bustin' loose all over" with schedules for their first lettings of Interstate jobs:

In the East . . . Vermont, heretofore troubled by lack of matching money, has been authorized a bond issue and can now go ahead. Also an archaic law holding up right-of-way acquisition has been cleared away. Maine and New Hampshire, too, have obtained legislative approval for bond issues to ease their money problems and are ready to roll. Massachusetts has had trouble getting locations approved. Big projects have been tied up over public hearings. Still, officials hope to place $107 million worth of work on the market in the next six months (for a total of $126.6 million in 1957), $140 million worth in '58, and $150 million worth each year thereafter for the next ten years.

Connecticut's big turnpike is very much under way and final projects will be let this year. North Carolina in high gear, second only to Texas in lettings, has 189 jobs under way on 979 miles and expects to maintain its pace. New York plans to climb from last year's volume of $210 million in lettings to a level of $300 million. Virginia has released a tentative schedule of lettings to the end of this year. It includes about 31 projects on the Interstate system. Florida will spend $22 million this year in a running start on its $115 million Greater Miami Expressway.

(continued on next page)

In the West . . . Texas is really going - $20 million worth of work a month scheduled for the next five months. Contractors hope to see $250 million in contracts reach them this year, compared to $175 million last year. A new law that the state will pay half the right-of-way cost of a project has stepped up land purchasing. Motor vehicle tax increases have just been OK'd by the legislature to provide the funds. California is letting work to the limit of its federal-aid apportionment, and expects to keep up that pace. Some $75 million worth of work will be contracted in the next six months.

In the Midwest . . . Missouri expects to continue lettings at much the same pace, perhaps boosting volume from $70 million to $75 million next year. Kansas is a good example of state that has "unwound with a bang." Contract awards in the first five months of this year compared roughly with the same period of the last four years, even less than some. With "whopping big" lettings in June, July and August, the state moved into high gear. Now officials hope to award 100 miles of heavy grading and accompanying structures on its Interstate system during the 12 months ahead. North Dakota has drafted tentative month-by-month bid schedules for Interstate jobs for the next 22 months. A Nebraska county court has just appraised land for the first 6.4-mile leg of the state's Interstate system. Minnesota's first segment of her 935-mile Interstate mileage was let late in July. The 8.3-mile job went for $1,466,987.

* * *

In some 45 state capitols during recent weeks, legislatures have contributed to progress of the highway program in dozens of various ways. Some cut away obsolete legal entanglements which have hampered right-of-way acquisition (15 states). Some boosted gasoline taxes to provide needed federal-aid matching funds (5 states). Some OK'd highway bond issues ($338 million worth in 9 states). Some approved reorganization plans which will streamline the operations of their highway departments. With these and many other miscellaneous measures the lawmakers gave their roadbuilders new tools for the big construction job.

* * *

Such seemingly unrelated developments must all be taken into consideration in appraising the prospects for more work in the months just ahead. They are all factors which will exert an effect on the roadbuilding market in the months ahead. The big money is still available and coming faster. How fast it reaches each state depends entirely on how strong its highway department is.

The hopefulness with which the weeks ahead are viewed was revealed in comments to Roads and Streets last month by two leading equipment manufacturers - Julian Steelman, president of the Koehring Company, and Clarence E. Killebrew, vice president of Clark Equipment Company.

"We are definitely looking for the year ahead to be a better one - in work for the contractor and in sales for us," declared Mr. Steelman.

Mr. Killebrew was just about as confident of the future. "The upswing in highway construction will be felt within six months," he said. "Equipment deals are being settled noticeably faster already. We're fairly sure that contractors will be better off very shortly, or we wouldn't be bringing out the new products we have in mind."

The wheels are turning . . . things are looking up.

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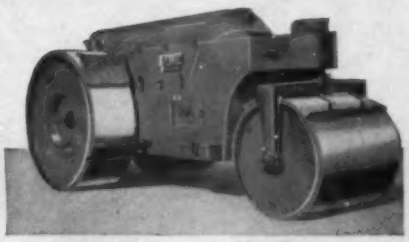

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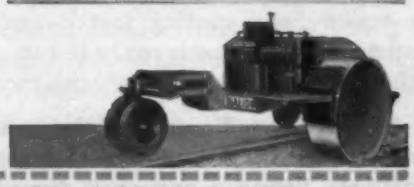

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TD-24 control ease puts record daily production at your operator's fingertips. Cool and safe flush-deck design, control-tower vision, and reach-easy fingertip controls all increase operator comfort and performance. Never before has big crawler work-power been so load-responsive—or record work-production so easy to achieve!

Prove positively your profit-margin widens—with geared-and-steered-for-action TD-24 power giving you the success-margin of push or pull! See your International Construction Equipment Distributor for a TD-24 demonstration!

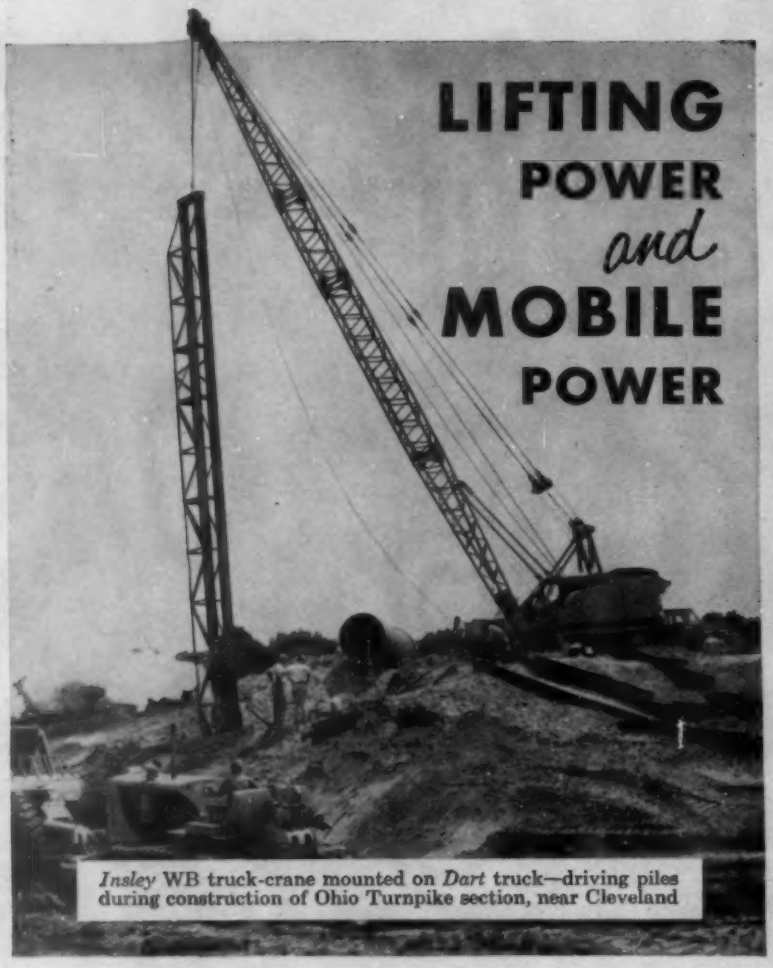
"The TD-24's 2-speed track steering holds you in 'dozing position with no slide-slip or power loss in turning," states Operator Jack Campbell for Owner J. H. Marshall, Clovis, New Mexico. The Marshall TD-24 is shown dozing tough caliche rock for road surfacing.

INTERNATIONAL® CONSTRUCTION EQUIPMENT

International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

. . for more details circle 285 on enclosed return postal card



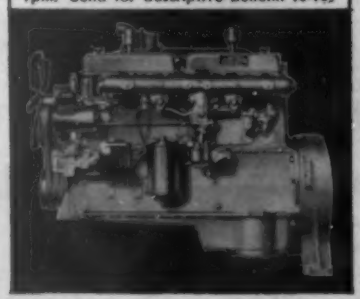
Insley WB truck-crane mounted on *Dart* truck—driving piles during construction of Ohio Turnpike section, near Cleveland

BOTH Crane and Truck have

WAUKESHA ENGINES

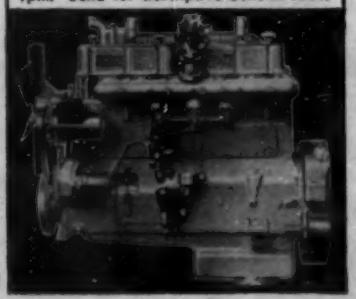
POWERING CRANE (Boom)

Waukesha 140-GK Gasoline—6-cyl., 4½ x 5½-in., 525 cu. in., 160 hp @ 2250 rpm. Send for descriptive bulletin 1548.



POWERING TRUCK (Carrier)

Waukesha 145-GK Gasoline—6-cyl., 5¼ x 6-in., 779 cu. in., 216 hp @ 2000 rpm. Send for descriptive bulletin 1551.



348

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

NEW YORK TULSA LOS ANGELES

. . . for more details circle 335 on enclosed return postal card

Headlines

$80,000,000 is Added to Illinois Toll Road Cost

Inflation has reared its ugly head with a vengenance in the Illinois toll road program, which currently involves more than a quarter of a billion dollars worth of construction contracts in force.

During August the toll road commission reported the painful fact that the job would cost $82,519,000 more than originally estimated. An additional $40,000,000 bond issue was to be sought to help complete

(Continued on page 34)

This Month's Cover

Pictured on the cover of this issue is a pair of shovels owned by a company which has tossed its hat into the roadbuilding ring, seeing years of opportunity ahead in this field for its excavating experience.

This firm is Gasparini Excavating Co., Inc., of Peckville, Pa. The company has worked for many years as strip mine excavators, having started the hard way from Gene Gasparini's small grocery store which catered to anthracite miners near Scranton.

Later the company branched out into other construction, and only in 1955 completed its first highway job, the $3 million bypass around Scranton and Wilkes-Barre, Pa. This was followed by a job on the Scranton interchange of the Northwestern extension of the Pennsylvania Turnpike (pictured on the cover).

Equipment shown consists of a model 93-M Marion shovel with 2½-yd. dipper and a Marion model 101-M shovel with a 3-yd. Esco dipper. This firm also used a P&H model 1600, 6-yd. electric shovel. This combination of equipment despite extremely difficult wet conditions averaged 4,000 to 5,000 cu. yd. per 8-hour day in winter and early spring.

The three shovels teamed up with a fleet of six Euclid model 43 TD, 22-ton and three model 63 TD, 22-ton rear-dumps, plus four 12-ton Euclids and a large fleet of supporting equipment for drilling, blasting, spreading and rolling and cleaning up.

this is the **TS-360**

15 yd struck
20 yd heaped
280 horsepower

this is the **TS-260**

11 yd struck
14 yd heaped
200 horsepower

now...

ALLIS-CHALMERS BRINGS YOU ANOTHER NEW MEASURE OF MOTOR SCRAPER PERFORMANCE

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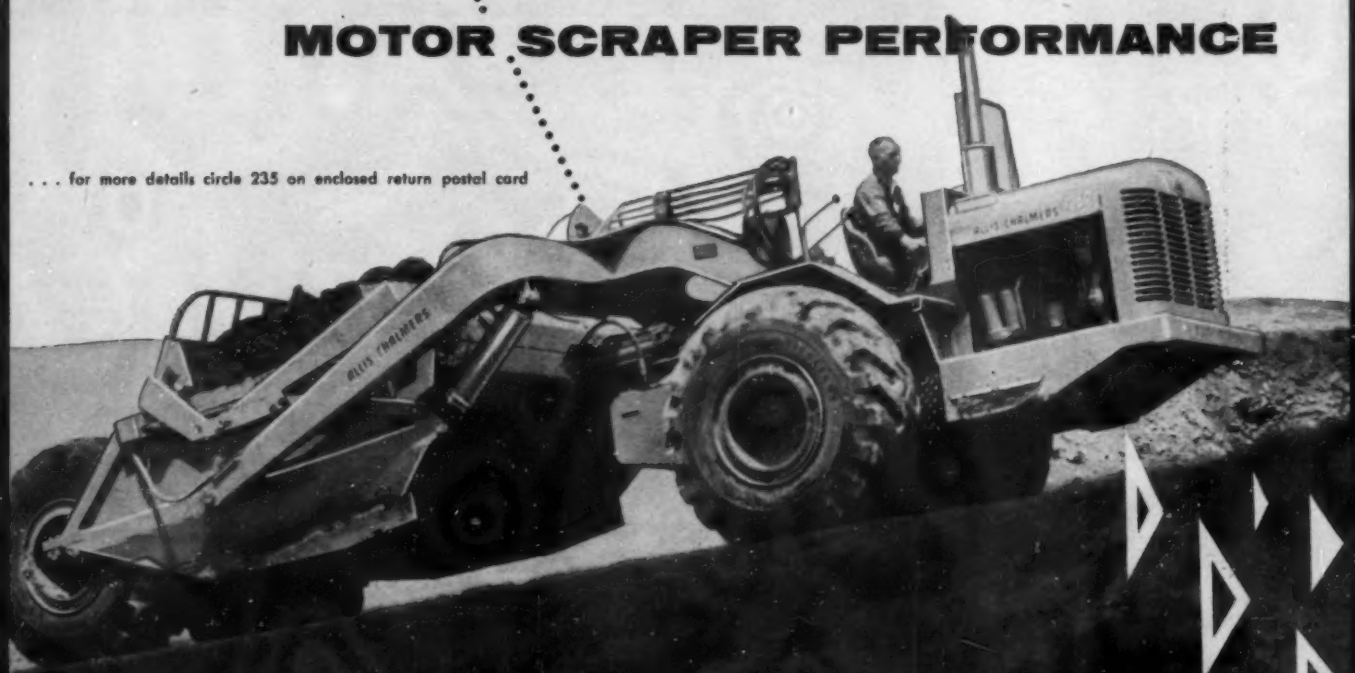

the TS-160

NEW Allis-Chalmers TS-160

7 yd struck

9.5 yd heaped

155 horsepower

5 speeds to 25.4 mph

12-ton payload

Measure these advantages for

22 hp per struck yard—Big Allis-Chalmers supercharged diesel engine delivers extra lugging ability for tough pulls, fast loading. Versatile TS-160 can team up with big equipment or work alone on long- or short-haul construction jobs—handle a wide range of utility jobs, travel at speeds up to 25.4 mph.

Measure these features . . . Allis-Chalmers 516-cu-in. diesel engine—dependable power at all working speeds • Independent, constant live hydraulic power for steering and scraper operation • Low, wide bowl—8-ft, 1½-in. cutting edge . . . 3-piece, interchangeable cutting edges . . . double-acting hydraulic bowl lift jacks • Positive hydraulic ejection, high apron lift to full 7-ft, 1½-in. opening • Roomy operator's compartment, easy-to-reach controls, 24-volt direct electric starting, adjustable bucket-type seat, synchronized 4-wheel air brakes • Big push block for all types of pushers—positioned for in-line push • Full-circle visibility while loading, spreading and traveling . . . operating ease under all conditions • 17¾-in. minimum ground clearance in hauling position.

a wide range of construction jobs . . .

Turns non-stop in less than 25 ft with 90-degree hydraulic steering . . . easy maneuverability in narrow cuts, faster cycles without reversing in tight turn-arounds.

Moves quickly from job to job . . . when required, transport wheels are available to meet legal load limits for highway travel.

Allis-Chalmers, Construction Machinery Division
Milwaukee 1, Wisconsin

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ALLIS-CHALMERS

Engineering in Action

GENTLEMEN: Have the Allis-Chalmers Construction Machinery dealer serving my area arrange a demonstration of the TS-160 motor scraper for me ☐.

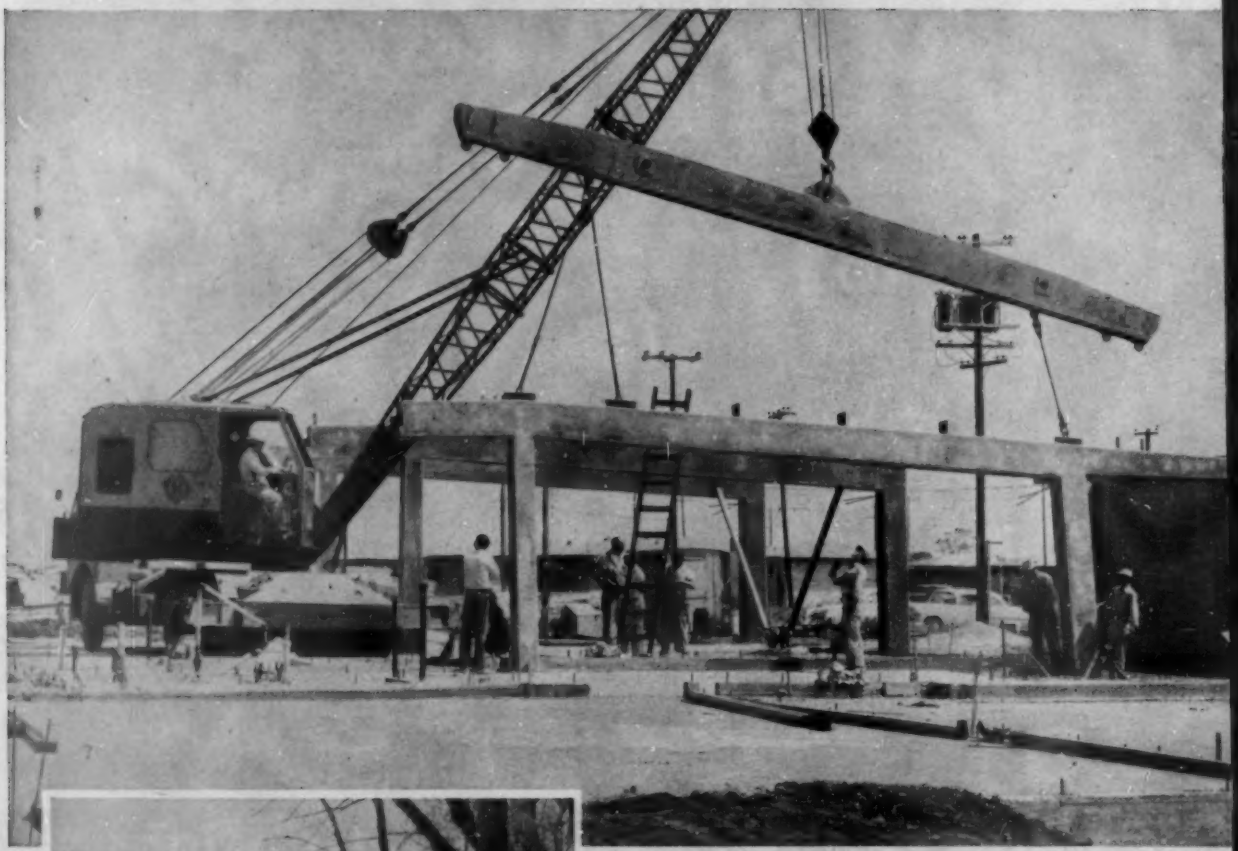
Name_____

Address_____

City_____ State_____

Type of work_____

KOEHRING WORK CAPACITY *in action* . . .



Pre-cast concrete bents, weighing 9 to 14 tons, had to be erected on construction of a new school. Above photo shows how the contractor got the job done with a Koehring 305 truck crane. It has a top lifting capacity of 25 tons, and boom lengths from 30 to 100 feet, plus 15 to 30 feet of jib — handles maximum 130-foot boom and jib with low A-frame. Butt-connected crane boom is safe, solid. Inserts are easily changed — only 2 bolts per corner.

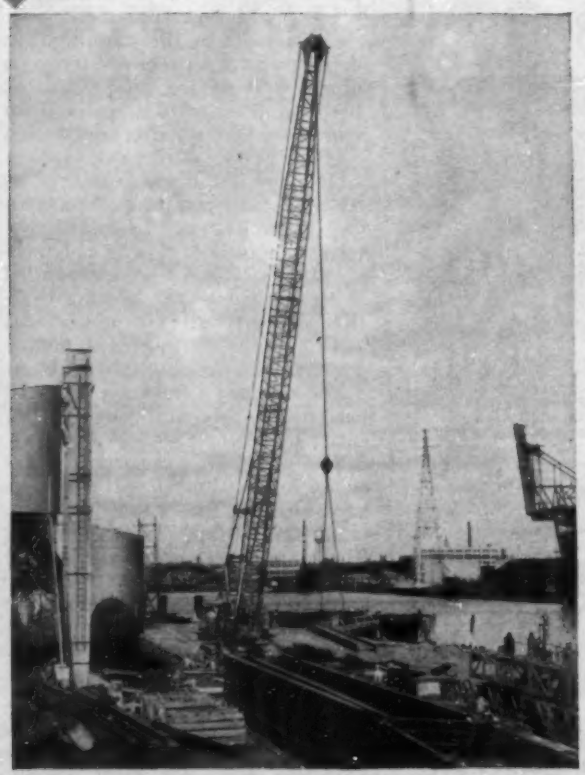
Sewer installation — 3 miles of 8-inch pipe, 5 miles of 6-inch pipe, and 6 miles of 4-inch pipe were layed in a hurry, with the help of this Koehring ½-yard hoe. Edging along the curb, pole-line, trees, it cut trench through black-top pavement and set pipe in place at a rate of 800 feet per day. The heavy-duty 205 hoe has a maximum digging depth of 17¾ feet — and widths up to 31 inches over side-cutters.

KOEHRING DIVISION OF KOEHRING COMPANY, Milwaukee 16, Wis.

45-ton roustabout — installing heavy machinery in the oil field, the new 445 truck crane (right) shows off its muscles. Heaviest load was a 23-ton mud pump — an easy lift for the big Koehring 445! It can pick up 45 tons with 40-foot boom at 15-foot radius. On high-lift work, it handles up to 120 feet of main boom, and 15 to 30-foot jib. Top travel speed on this mobile, heavy-lift crane is 31.8 mph.

A new 2-yard — Another size has been added to the Koehring *"work capacity"* team — a heavy-duty 2-yard, with 25-foot deep-section shovel boom, and 18½-foot twin dipper sticks. You'll like the 805's power, strength, and stability in heavy digging — and *extra capacity* as a clamshell, dragline, or crane (see lift rating chart below). Want to know more about it? Call Koehring distributor *right now*.

Look at the reach of the high-lift crane (below), starting construction on a new thruway. Boom lengths on this big Koehring 1205 range from 60 to 170 feet — and that's not all! When extra reach is needed, it handles up to *190 feet* of boom and jib. 90% power-assist on main-drum clutches gives operator light lever-pull and sensitive "feel" of load for precision lift work at every boom length.



Here are some figures that will interest you:

KOEHRING MODEL	SIZE DIPPER	LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load.)	
205 CRAWLER	½-Yd.	20,000 lbs.	at 10-ft. radius
205 ON RUBBER	½-Yd.	30,000 lbs. 14,600 lbs.	at 12-ft. radius at 20-ft. radius
305 CRAWLER	¾-Yd.	30,000 lbs.	at 12-ft. radius
305 ON RUBBER	¾-Yd.	50,000 lbs. 15,800 lbs.	at 10-ft. radius at 30-ft. radius
405 CRAWLER	1-Yd.	40,000 lbs.	at 12-ft. radius
445 ON RUBBER	(Crane only)	90,000 lbs. 40,000 lbs.	at 15 ft. radius at 25-ft. radius
605 CRAWLER	1½-Yds.	72,300 lbs.	at 12-ft. radius
805 CRAWLER	2-Yds.	184,200 lbs.	at 12-ft. radius
1205 CRAWLER	3-Yds.	190,000 lbs.	at 12-ft. radius

Want more information? See Koehring distributor.

EXCAVATORS • CRANES • DUMPTORS® • PAVERS • FINISHERS • CONSTRUCTION MIXERS • MUD-JACKS®

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Headlines

(Continued from page 28)
the job, in addition to using reserve funds.

The $82,519,000 deficit is broken down into several sources. Right-of-way has cost $11,226,000 more than expected, utilities $687,000 more, construction contracts to date $64,710,000 more, engineering $3,663,000 more, legal and administrative $200,000 over, and additional projects not originally contemplated, another $2,000,000.

The biggest increase has been in construction contracts, some of which have been awarded at figures far above estimates. Bid items compared with 1955 estimates as tendered by the contractors have averaged 160 percent over the original estimates for crushed stone base, 77 percent for structural steel, 106 percent for granular subbase, 90 percent over for selected subgrade, 71 percent over for earth borrow, and 36 percent over for 10 in. concrete pavement.

The news report issued on this situation by the commission noted that the number of bidders declined when the advertised projects were in Cook County. "Attempts were made to interest contractors throughout the United States in submitting proposals on Illinois toll work," the report continued. "These attempts were unsuccessful as only local contractors, for the most part, working on a joint venture basis with certain out of state firms, bid on individual contracts."

Pennsylvania Contractors Get Break in New Legislation

Pennsylvania road contractors will have considerable less money tied up in their jobs, as the result of a new state law. The law's provisions:

1. Reduction of the retained percentage on highway contracts from 10 percent on current estimates throughout the entire job to 10 percent on current estimates until 50 percent of the project has been completed;

2. No retained percentage to be withheld by the state highway department after 50 percent of the project has been completed;

3. Payment by the state highway department of 5 percent interest on monies retained on final estimates, if the final estimate is retained for more than 90 days after completion and acceptance of the project.

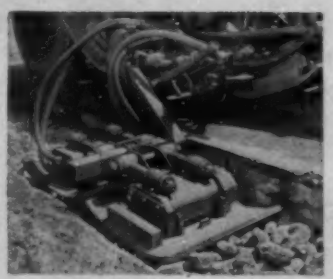
The legislation was sponsored by Associated Pennsylvania Constructors, which became particularly concerned about the problem of financing highway jobs after the expanded Federal highway act became effective. Pennsylvania's new law will assist highway contractors in financing their projects by the reduction of the retained percentage from 10 percent to 5 percent throughout the entire project.

The payment of 5 percent interest on final estimates will correct a hardship that has existed for many years. Over a long period (see July Roads and Streets) certain highway districts throughout Pennsylvania have failed to complete their final figures on projects for many months and in some cases, for years. There have been cases when as many as 30 months have elapsed after completion of jobs before contractors have received their final payments. This has resulted generally from the state highway department not having sufficient corps and engineers to take off the final estimates.

Cut your high-density compaction costs with the LIMA ROADPACKER

Macadam Bases—Coarse aggregate for bases up to 12 in. thick can be spread in a single layer, then uniformly compacted to final density by the Roadpacker over a 13 ft., 1 in. width. This single course construction, possible only with vibrators, reduces spreading time by half. Also it eliminates the need for backtracking all the equipment for the second pass; and contour shaping is done once—instead of twice. In waterbound work, the Roadpacker's tamping and vibrating action runs in screenings solid from top to bottom. Only three spreads of screenings are required, and much of the hand labor of spreading, brooming and rolling is eliminated.

Gravel Subbases and Soil Cement Bases—Specified density is obtained in one to three passes, depending on material and depth. Because the Roadpacker compacts equally well traveling forward or in reverse, there's no deadheading when two or more passes are needed. Vertical packing action prevents troublesome shoving on difficult materials and does not drift the spread down on super-elevations.



Widener Attachment—Vibrating shoes compact material in widening trench while Roadpacker runs on existing pavement. Easily adjusted for various width trenches.

ROADPACKER FEATURES

- **Low maintenance**—*Rugged vibrator shoes are pressure lubricated and actuated hydraulically through a completely sealed system. There are no exposed moving parts, no oil levels to check, no breather holes through which oil can escape.*
- **Fast and maneuverable**—*Highway speeds up to 28 mph, reverse speeds up to 7 mph. Steers easily. For work in tight places, can be operated with only four shoes. Shoes can be folded up easily and need not be removed from machine.*
- **Easy to operate**—*Operator is above dust, away from engine heat and exhaust for maximum comfort and efficiency. He has excellent visibility . . . controls are readily accessible.*

Get all the facts on the new Lima Roadpacker—write for your copy of the Roadpacker bulletin today.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA ROADPACKER — **BALDWIN-LIMA-HAMILTON** Construction Equipment Division — LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation Hamilton • Lewis-Hydropress • Madsen • Pelton • Standard Steel Works

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MILES PER HOUR	ENGINE REVOLUTIONS PER HOUR IN CONVENTIONAL AXLE HIGH	IN EATON AXLE HIGH-HIGH	SAVED
10	37480	33995	3485
20	74960	67990	6970
30	112440	101985	10455
40	149920	135980	13940
50	187400	169975	17425

Based on most popular axle ratios and tire size.

EATON 2-Speed Axles Cut Down "Revolutions per Mile"

Save Operating and Maintenance Costs—Make Trucks Last Longer!

The chart above shows the big reduction in engine revolutions made by Eaton 2-Speed Axles in high-high gear ratio. Fewer Revolutions per Mile mean reduced piston travel, less wear on every rotating engine part and power transmitting unit.

Not only when highballing on the open highway—but in every hauling situation—pulling out of the hole under full load, climbing steep grades, maneuvering in city traffic—Eaton 2-Speeds save wear and tear on engines by permitting them to operate in their most economical speed range. This results in important savings in operating and maintenance costs, thousands of extra miles between engine overhauls, fewer interruptions of operation, and more miles in the life of the truck.

More than Two Million Eaton Axles in Trucks Today. For complete information, see your truck dealer.

EATON AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioners Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

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Biggest Favorites . . . because they're Biggest Savers!

BUFFALO-SPRINGFIELD ROLLERS

are made to cut schedule time, job and operating costs

These rollers, two Standard-Duty and one Heavy-Duty model, are built with the contractor in mind. All have many outstanding and exclusive performance-plus features. They represent the very best tandems on the market today.

Heavy-Duty models, ranging from 5-8 to 10-16 tons, are designed especially for heavy-duty highway and public works projects, and for all types of finishing, maintenance and repair work. Built-in quality features . . . such as unmatched 4-speed transmission or torque converter drive with 2-range transmission, powered roll brakes, higher ground clearance, greater operator visibility, complete protection against any possible damage to the transmission and final drive gears . . . cut operating and maintenance costs to an absolute minimum.

Standard-Duty models, designed and built with the thought in mind that not every job, not every user, requires the ultimate in roller equipment, are available from 5-8 to 10-14 tons — and for the dollar invested, represent the finest rollers on the market today.

Both lines offer the best in: choice of highly efficient gasoline or diesel power • finest adjustable bevel gear final drive • single power unit assembly assuring precision alignment of engine, transmission and final drive pinion • variable rolling speeds in either direction up to 5.6 mph • low-pressure hydraulic steering • and adjustable, tapered roller bearing yoke and king pin assembly.

Before you buy another 2-axle tandem roller, see your Buffalo-Springfield distributor; write for complete details.

BUFFALO-SPRINGFIELD ROLLER CO.

DIVISION OF KOEHRING COMPANY • SPRINGFIELD, OHIO

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New Publications

ASTM Proceedings for 1956

The 1956 edition of the ASTM proceedings, a 1510-page volume, records the accomplishments of the American Society for Testing Materials for the year 1956. It includes technical reports and papers with discussions.

A summary of the 59th annual meeting held June 1956, noting the title and author of each paper presented, is included. Thirty-two technical sessions are thus covered, along with reports of 80 technical committees with appendices and 52 technical papers with discussions are included in the volume which contains a wealth of material for a variety of subjects. Symposia published separately as special technical publications and all papers published in the ASTM bulletin during the year are listed by title and author.

Copy available from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. Price $12.00.

HAND BOOK OF RIGGING, by W. E. Rossnagel. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. Price $6.50.

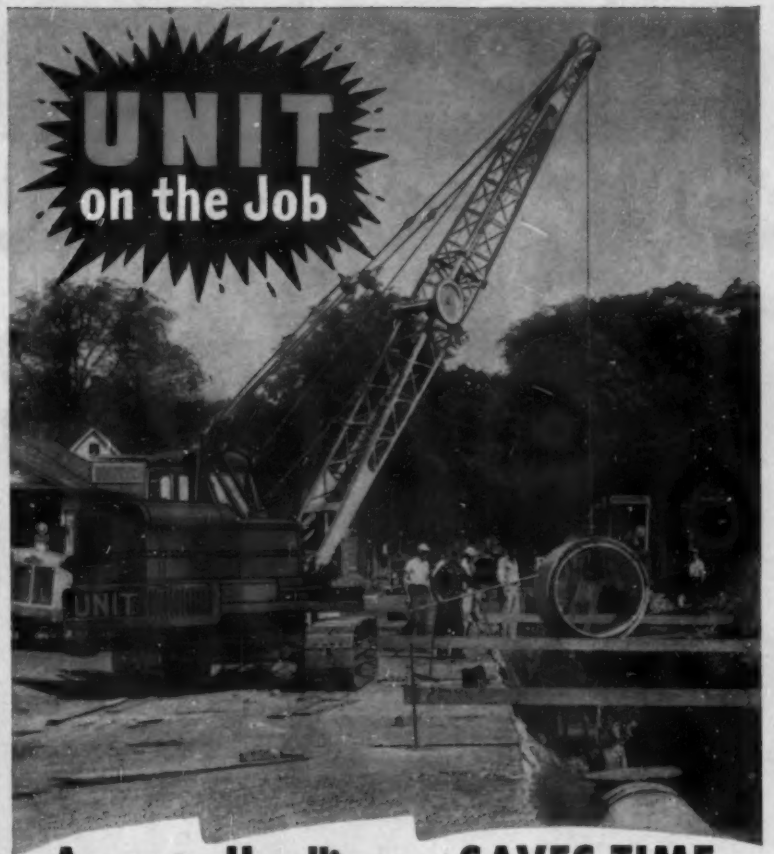
A thorough practical manual of rigging practices and pointers for construction and industrial personnel. Shows how to handle every step in any rigging operation from rigging a swinging scaffold to operating a hoist or using a hydraulic jack.

Simple formulas are included for calculating the strength of hoisting tackle, beams and posts, etc. Also data on safe loads on wire rope and chain, effective defects on the strength of timbers, reference codes, laws and standards relating to rigging, and other useful data.

TRACTORS AND CRAWLERS. By Irving Frazee and Philip V. Eshelman. 308 pages. Price $7.50. American Technical Society, 848 East 58th St., Chicago 37, Illinois.

This book was written to meet the need for a comprehensive training plan to provide the broad knowledge of principles necessary to skillful selection, maintenance and repair of the modern tractor and crawler. Not only construction contractor executives but also mechanics and operators should find

(Continued on page 39)

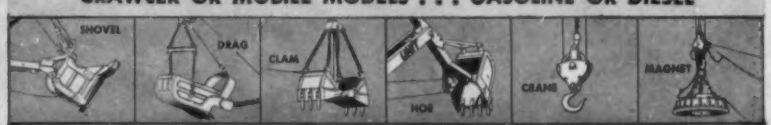


Accurate Handling . . . SAVES TIME

This sturdy UNIT Crawler Crane offers plenty of power plus accurate control. Spots heavy sewer pipe perfectly into the desired position. Adjustable Hook Rollers, Extra Long Crawlers and Wide Multiple Hinged Crawler Shoes provide all-around stability. Full Circle Swing, controlled from within UNIT'S FULL VISION CAB, provides safe and efficient operation. The operator has a complete view of the entire job at all times. GET THE FACTS! Investigate this modern UNIT and its many features. Write today for literature.

UNIT CRANE & SHOVEL CORPORATION
6401 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

½ or ¾ YARD EXCAVATORS . . . CRANES UP TO 20 TONS CAPACITY
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL



All Models Convertible to ALL Attachments!

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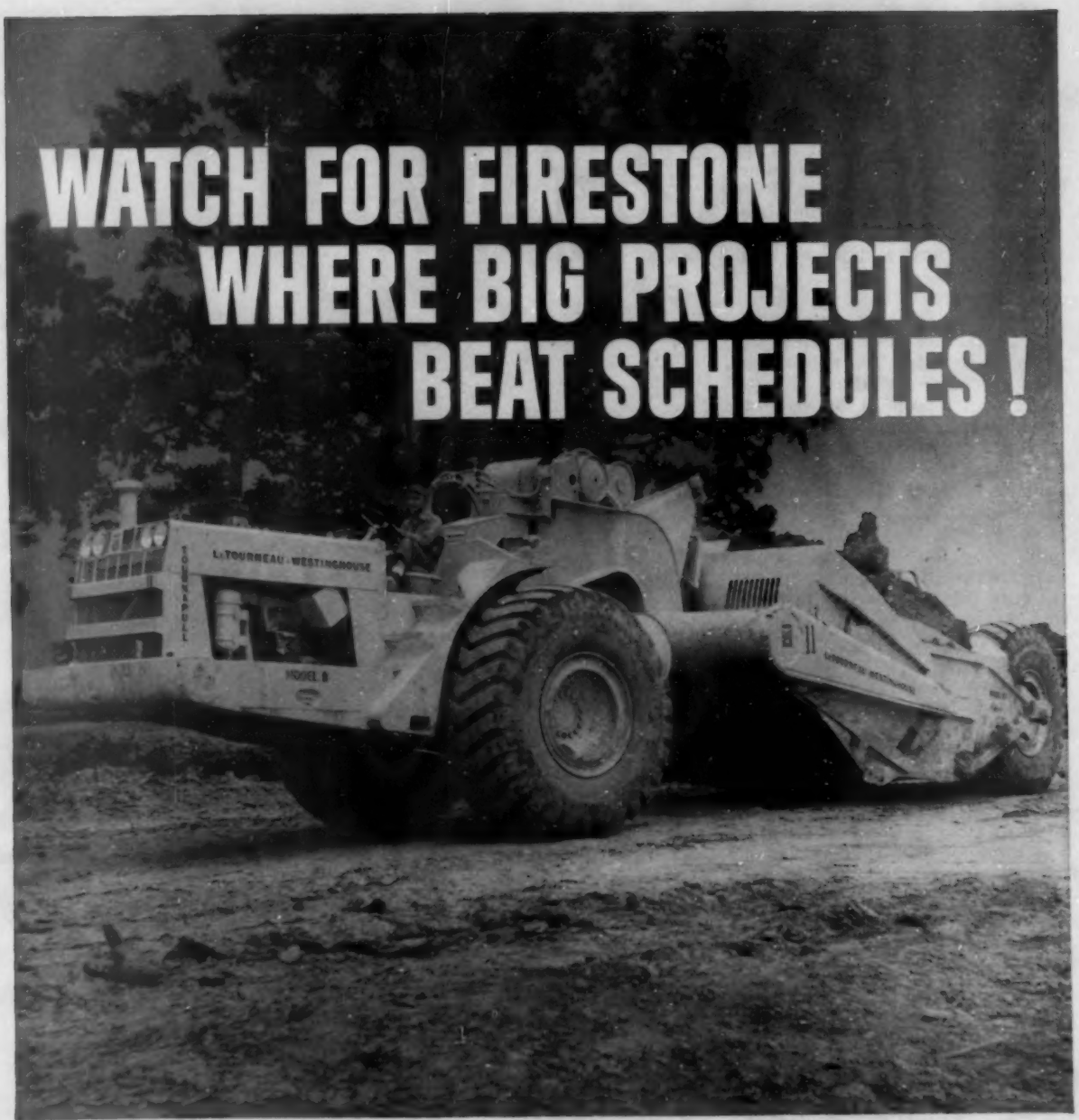
WATCH FOR FIRESTONE WHERE BIG PROJECTS BEAT SCHEDULES!



Firestone Rock Grips lead all tire choices for heavy equipment on all job conditions!

Firestone Tubeless Rock Grips save time two ways! Off-highway users make them their first choice of tires for beating downtime losses. They're top choice, too, when it comes to rolling heavy equipment over all types of terrain. Two great treads eliminate your need for changing tires to match the job. You get the *full flotation* you need for sand and soft stuff. And the same tread gives you the *armored grip* you want for hauls over rock or rubble. Safety-Tensioned *Gum-Dipped*® NYLON bodies, combined with specially compounded treads, defy cuts and slugging impacts. Ask your Firestone Sales Engineer about these heavy construction favorites. Contact him today—through your local Firestone Dealer or Store.

Enjoy the Voice of Firestone on ABC television every Monday evening.

ROCK GRIP WIDE BASE ROCK GRIP

Firestone

BETTER RUBBER FROM START TO FINISH

Copyright 1957, The Firestone Tire & Rubber Company

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New Publications

(Continued from page 37)

this book useful.

Chapters are included on suspensions and steering, engines and accessories, power trains, brakes and hydraulic systems of virtually every major type of tractor and crawler now in use.

AMERICAN CIVIL ENGINEERING PRACTICE. Volume III. Edited by Robert W. Abbett, 1295 pages, price $25.00. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

This companion to Volumes I and II rounds out this basic reference series comprising 34 major sections. Volume III includes structure theory, masonry and plain concrete, reinforced concrete and many related structural subjects, as prepared by a staff of 54 specialists.

BITUMINOUS MATERIALS FOR HIGHWAY CONSTRUCTION, WATERPROOFING, AND ROOFING, with related information; D-4, D-8. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 6 x 9 paper cover, 460 pages, price $4.75.

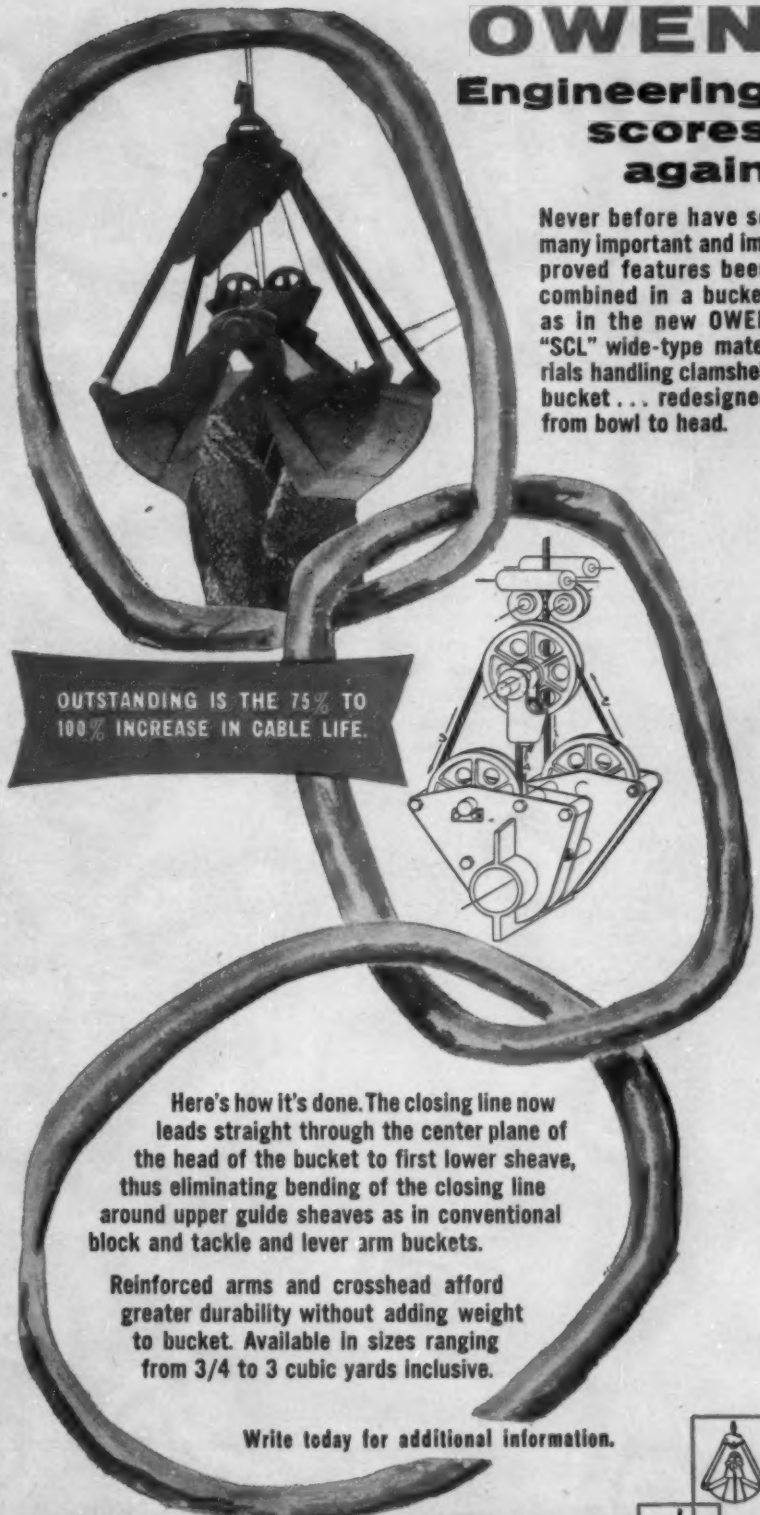
Includes specifications, test methods, recommended practices and definitions of terms pertaining to bituminous materials used in highway construction and in waterproofing and roofing. Prepared for producers and consumers of these materials, and especially useful to engineers and contractors engaged in road, street and highway construction.

This is the 6th edition of the compilation which is sponsored jointly by ASTM Committee D-4 on Road and Paving Materials and Committee D-8 on Bituminous Waterproofing and Roofing Materials. A few standards covering creosote materials which are under the jurisdiction of Committee D-7 on wood but of direct interest to the construction field are also included.

There are 112 standards in the compilation, 17 of which are new or revised since the previous edition was published in December 1955.

PORTLAND CEMENT CONCRETE IN HIGHWAY ENGINEERING. Practical procedures and technical information on the subject are contained

(Continued on page 46)


OWEN
Engineering scores again
Never before have so many important and improved features been combined in a bucket as in the new OWEN "SCL" wide-type materials handling clamshell bucket . . . redesigned from bowl to head.
OUTSTANDING IS THE 75% TO 100% INCREASE IN CABLE LIFE.
Here's how it's done. The closing line now leads straight through the center plane of the head of the bucket to first lower sheave, thus eliminating bending of the closing line around upper guide sheaves as in conventional block and tackle and lever arm buckets.
Reinforced arms and crosshead afford greater durability without adding weight to bucket. Available in sizes ranging from 3/4 to 3 cubic yards inclusive.
Write today for additional information.
The OWEN BUCKET Co.
BREAKWATER AVENUE, CLEVELAND 2, OHIO
BRANCHES: New York • Philadelphia • Chicago
Berkeley, Calif. • Fort Lauderdale, Fla.

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Clipper®

"SAILS RIGHT THRU"

CONCRETE SAWING... BLADES

BEST for... All SAWS Any AGGREGATE Every JOB!

● YOU NAME IT...

The Saw-The Job-The Aggregate

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3 TYPES

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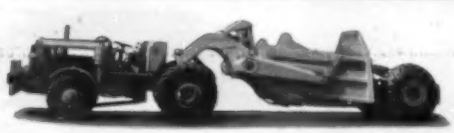
SCRAPERS

Complete data on Euclid Scrapers shown on the following pages is available from the dealer in your area or from Euclid Division.

TWIN-POWER

OVERHUNG ENGINE



SIX WHEELER

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TWIN POWER for OUTSTANDING PERFORMANCE

This exclusive Euclid development has put the "Twin" years ahead of any other scraper . . . in performance, workability, and in productivity. By using two engines—each driving an axle through separate Torqmatic Drives—the "Twin" has tremendous power and traction. It can work independent of other equipment on small grading jobs or big yardage projects. It has set new production records on a wide range of earthmoving work and has consistently moved the cheapest dirt.

With "Twins" in your fleet you can meet the challenge of tougher competition and rising costs and still protect your profit margin.

SPECIFICATIONS

Model TS-24

518 total h.p. • 24 yds. struck and 32 yds. heaped • 27.00 x 33 tires • Torqmatic Drives • NoSpin Differentials

(33.5 x 33 tires available as optional equipment)

All Euclid Scrapers have these *profit-making* features:

3 SIZES of OVERHUNG SINGLE ENGINE SCRAPERS

With struck capacities of 7, 12 and 18 cu. yds., there's an overhung engine type "Euc" for practically any job requirement. Each is a top performer in its class with advanced design features that cut cycle time and step up production. Short "nose" overhang provides greater stability and operator comfort—permits "Eucs" to utilize faster travel speeds. Full 90° steering with push-pull hydraulic jacks gives good maneuverability, short non-stop turns.

All of these scrapers are designed for easy maintenance—major disassembly is not necessary to service or replace main components of power train. This cuts downtime to a minimum and pays off in more payloads per day and lower maintenance cost.

MODELS AND SPECIFICATIONS

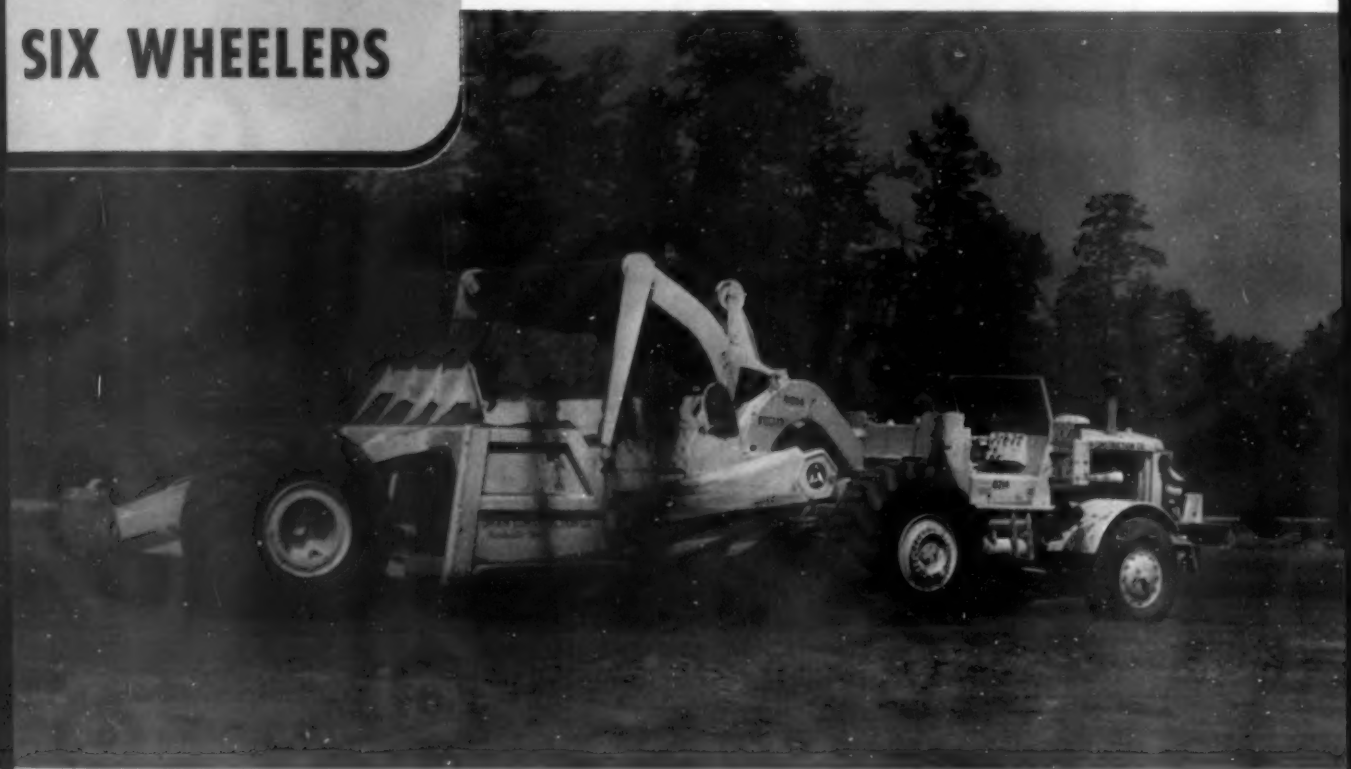
S-7	143 h.p. • 7 yds. struck and 9 yds. heaped • Torqmatic Drive 18.00 x 25 tires (21.00 x 25 optional)
S-12	218 h.p. • 12 yds. struck and 16 yds. heaped • 5 speed transmission 24.00 x 25 tires
S-18	300 h.p. • 18 yds. struck and 25 yds. heaped • 4 Speed Torqmatic Drive • 27.00 x 33 tires (33.5 x 33 optional)

Note: Rear-Dumps of 12 and 35 tons are interchangeable with Models S-7 and S-18 respectively • 13 yd. Bottom-Dump is available for Model S-12.

Hydraulic Lever Action • 4 section Reversible and Interchangeable Cutting Edges • Original low wide bowl design • Performance-Proved Euclid Planetary Drive • Unequalled Accessibility • Easy Operation Fast Loading and Dumping

3 SIZES of SIX WHEELERS

For high speed, long haul work, these 4-wheel tractor scrapers provide maximum stability. They have struck capacities of 12, 18 and 24 yds. and the same cost-cutting features—hydraulic lever action, 4-section cutting blade, low, wide bowl, etc.—of other Euclid models. In spite of rugged structural strength that's designed for work with big pushers, these "Eucs" have less weight per horsepower, giving them performance that helps protect your profit margin by moving more yards at lowest cost.



MODELS AND SPECIFICATIONS

SS-12	200 or 218 h.p. • 12 yds. struck and 16 yds. heaped • 5 speed transmission • 21.00 x 25 drive and scraper tires (24.00 x 25 optional)
SS-18	300 h.p. • 18 yds. struck and 25 yds. heaped • 3 speed Torqmatic Drive • 24.00 x 25 drive and scraper tires (29.5 x 25 optional)
SS-24	300 or 335 h.p. • 24 yds. struck and 32 yds. heaped • 4 speed Torqmatic Drive with converter lock-up • 27.00 x 33 drive and scraper tires (33.5 x 33 optional)

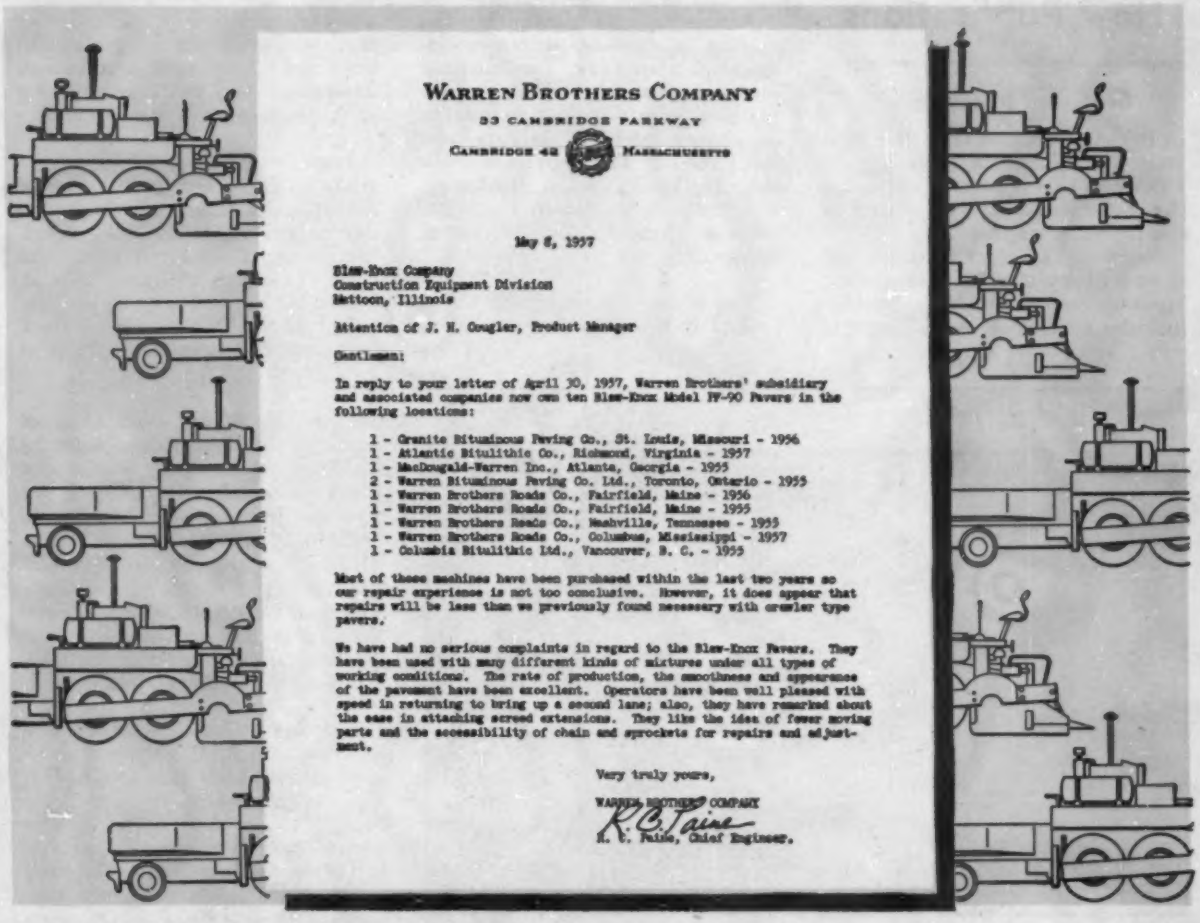
Note: Bottom-Dumps of 13, 17 and 25 yds. struck are interchangeable with the scraper bowls.

EUCLID DIVISION

General Motors Corporation • Cleveland 17, Ohio

Form No. 510

577-350—Printed in U. S. A.



WARREN BROTHERS COMPANY
33 CAMBRIDGE PARKWAY
CAMBRIDGE 42 MASSACHUSETTS

May 6, 1957

Blaw-Knox Company
Construction Equipment Division
Mattoon, Illinois

Attention of J. H. Coogler, Product Manager

Gentlemen:

In reply to your letter of April 30, 1957, Warren Brothers' subsidiary and associated companies now own ten Blaw-Knox Model PF-90 Pavers in the following locations:

1 - Granite Bituminous Paving Co., St. Louis, Missouri - 1956
1 - Atlantic Bitulithic Co., Richmond, Virginia - 1957
1 - MacDougald-Warren Inc., Atlanta, Georgia - 1955
2 - Warren Bituminous Paving Co. Ltd., Toronto, Ontario - 1955
1 - Warren Brothers Roads Co., Fairfield, Maine - 1956
1 - Warren Brothers Roads Co., Fairfield, Maine - 1955
1 - Warren Brothers Roads Co., Nashville, Tennessee - 1955
1 - Warren Brothers Roads Co., Columbus, Mississippi - 1957
1 - Columbia Bitulithic Ltd., Vancouver, B. C. - 1955

Most of these machines have been purchased within the last two years so our repair experience is not too conclusive. However, it does appear that repairs will be less than we previously found necessary with crawler type pavers.

We have had no serious complaints in regard to the Blaw-Knox Pavers. They have been used with many different kinds of mixtures under all types of working conditions. The rate of production, the smoothness and appearance of the pavement have been excellent. Operators have been well pleased with speed in returning to bring up a second lane; also, they have remarked about the ease in attaching screed extensions. They like the idea of fewer moving parts and the accessibility of chain and sprockets for repairs and adjustment.

Very truly yours,

WARREN BROTHERS COMPANY
R. C. Paine
R. C. Paine, Chief Engineer.

Warren Brothers' experience with ten PF-90 pavers highlights • Lower upkeep • Excellent production rates • Easy operation • Smooth, good looking pavement

Read this latest field report on the Blaw-Knox PF-90 Bituminous Paver. It's another instance of the high performance turned in by this radically different paver-on-wheels working under a wide variety of job conditions.

Like yourself, Warren Brothers demand high performance from their machines in order to get the maximum return on equipment dollars. Proof of performance, proof that "on wheels it will pave for less" is that Warren Brothers own *ten* PF-90 pavers today. Get the full story for yourself. Call your Blaw-Knox Equipment Dealer today.

BLAW-KNOX

These dealers say "On wheels it will pave for less"

BLAW-KNOX COMPANY

Construction Equipment Division
44 Charleston Avenue, Mattoon, Illinois

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New Publications

(Continued from page 39)

in this new booklet from the University of Wisconsin extension divisions. The 134-page report is for the construction worker as well as the highway engineer.

Based on a recent institute, co-sponsored by the Wisconsin state highway commission, the booklet includes articles by several experts describing new methods in highway and bridge construction.

Among topics are: handling and placing of concrete mixtures; inspecting concrete construction; forms for small highway structures; practical points about construction of county highway bridges and many others. The booklet is available at the Extension Bookstore, University of Wisconsin Extension Division, Madison 6, Wis., for $2.50.

THE NIGHT-TIME ACCIDENT PROBLEM. Published by Pageant Press, 101 Fifth Ave., New York 3, N. Y. 112-page book analyzing causes of night-time accidents and correlating them with available data which will help traffic and safety engineers in analyzing causes and in considering problems related to this subject.

ELEMENTARY THEORY OF STRUCTURES by C. K. Wang, Professor of Architectural Engineering, University of Illinois; and C. L. Eckel, Professor of Civil Engineering and Dean of College, University of Colorado. 387 pages, 6 x 9, 558 illustrations, $7.50. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N. Y.

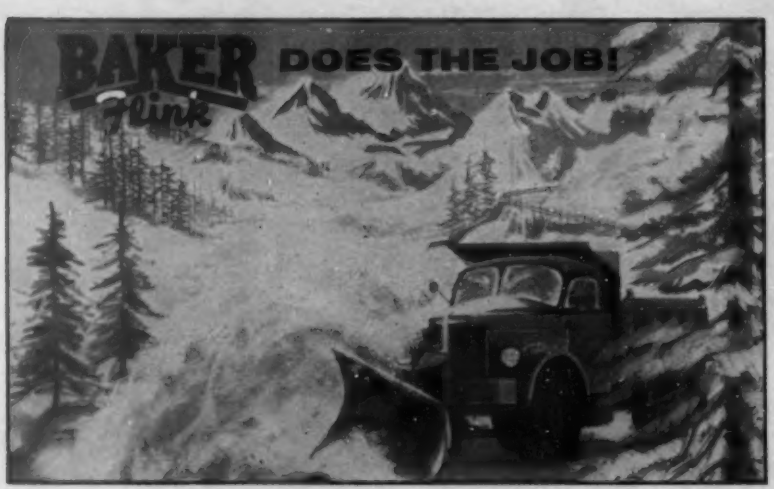
ROAD RESEARCH 1956. Annual report of the Road Research Board including report of the Director of Road Research, Department of Scientific and Industrial Research, London. Available at $1.04, post paid to U.S. inquirers from British Information Services, 45 Rockefeller Plaza, New York 20, N. Y. Contains a wealth of highlight information on various aspects of highway technical development in England.

SALVAGING OLD PAVEMENTS BY RESURFACING. Bibliography 21 (Annotated). Highway Research Board, 2101 Constitution Avenue, Price $1.00. This publication includes 80 references covering rigid-type and flexible-type overlays. Prepared by the Board's committee on salvaging old pavements with the help of industry associations.

PERFORMANCE OF BITUMINOUS SURFACING. Bulletin 154, Highway Research Board, 2101 Constitution Ave., Washington, D. C. Price $0.80.

The paper "Field and Laboratory Investigations on Hot Mix Asphalt Concrete" was prepared by John W. Shupe and Delos C. Taylor of the Department of Applied Mechanics, Kansas State College. This report presents a comparison of experimental road test sections of asphaltic concrete for three years of service. This investigation is a part of a cooperative study of the State Highway Commission of Kansas and the Applied Mechanics Department of Kansas State College.

The paper "Service Record Study of Bituminous Concrete and Sand Asphalt Pavements in North Carolina," was presented by A. Duke Morgan of the North Carolina State Highway and Public Works Commission. It is the second performance report on observations of several test sections of high-type bituminous concrete.



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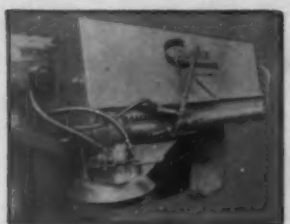
Reversible or One-Way Plows with Sectional or Full Blade Trip permit fast, efficient cleaning over expansion joints, irregular pavement and other road hazards without damage to the blade. "Roll Action" moldboard keeps snow and slush moving from the center of the blade and off the roadway for high speed service. There's a Flink-Baker hydraulic power lift with both underframe or front push mounting to meet every specification.



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Model S5 Low cost, pull-type for ice, dust control and seal coating. Spreads all granular materials.

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wheelbarrow mounting for easy mobility!

better concrete at lower cost!

The famous 7GVW21 Concrete Vibrator has 4 great features that make it right for you!

- Dependably powered by rugged single-cylinder, 4-cycle air-cooled gasoline engine with countershaft drive and automatic clutch.
- This versatile unit can also be used to power attachments for concrete surfacing, sanding, wire brushing, pumping and other jobs.
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MODEL 7GVW21 *5 HP concrete vibrator. Available with 2⅛" x 20" 7,000 RPM vibrating head or 2⅜" x 12" 10,000 RPM vibrating head.*

You'll use less cement, coarser aggregate and produce denser, more uniform concrete...and do it in fewer man-hours!

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You name it...Mall Tool Company, Division of Remington Arms Company, Inc., gives you a vibrator for every application from small form work to large mass concrete compaction. Over a dozen models, most available in gasoline engine, electric or pneumatic, including the new 1-man 115-volt vibrator with motor-in-head. Let us send you our latest catalog today!

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For the extra-rough jobs

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For all the details on this improved Traxcavator line, phone your Caterpillar Dealer—same man you call for expert service and replacement parts that don't let you down.

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ONE GOAL: To concentrate our capabilities, resources and experience on the design, manufacture, distribution and service of job-tested heavy equipment.

How M-K Staged the "Big Blast"

Here are some of the on-the-scenes details of the 1,790,-000-pound blast which Morrison-Knudsen Company, Inc., touched off July 21 for its Utah causeway project.

By H. K. Glidden Contributing Editor to Roads & Streets

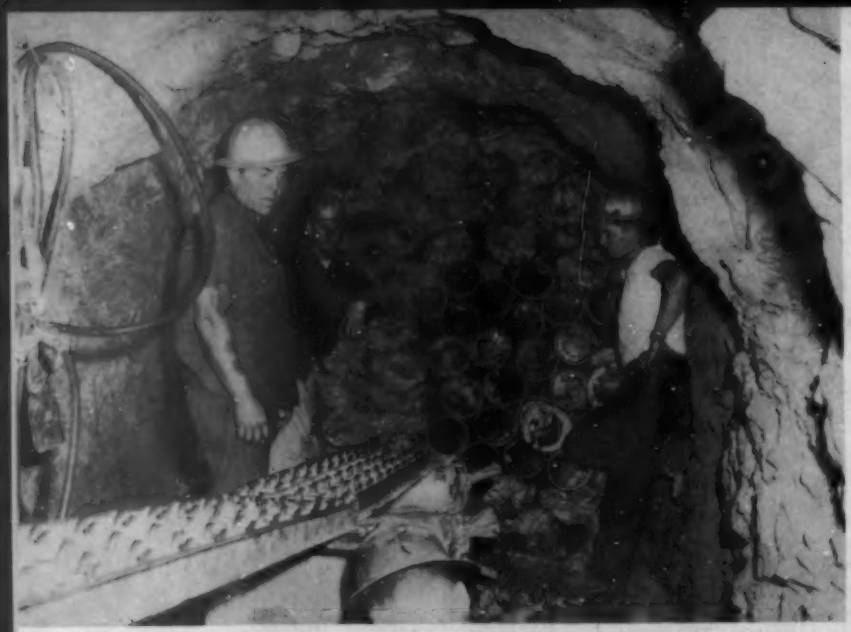
THE BIG construction blast in Utah which made front-page headlines in July has naturally aroused the curiosity of highway contractors. The *Roads and Streets* editors felt that readers would want to know something of the procedures, since many contractors will be using explosives increasingly under the expanding road program.

This largest man-made "boom" in history (excepting only atomic explosions) was set off by Morrison-Knudsen Company, Inc., near Little Valley, Utah. Utilizing 1,790,000 lb. of explosives, it produced an estimated 2,500,000 cu. yd. or more of material for the rock fill which this contractor is placing across Great Salt Lake for the Southern Pacific Railroad's Lucin cutoff reconstruction.

The blast was fourth in a series of six planned in a mountainside located on Promontory peninsula extending into Great Salt Lake. The 13-mile fill requiring 45,000,000 cu. yd. of material will, when finished, replace a wood pile structure which has served since 1904.

"Coyote holes" were used in preference to more conventional drilling methods as being the most economical way of producing the tremendous amounts of rock required. The accompanying diagram illustrates how the coyote holes or laterals branch off from two main tunnels located approximately 1300 ft. apart and running parallel to each

● **What the explosion from 900 tons of explosives looked like an instant after the detonation.**



● Note how the bagged Amocol and the dynamite sticks are packed.

● "Human chain" principle, a short belt conveyor and a section of wheel conveyor were used to stow bagged Atlas Amocol and 60% extra dynamite sticks back in the coyote hole.

● Bagged Amocol being taken from freight car on a wheel conveyor. Dynamite sticks seen on flat-bed truck at far right.

other at right angles to the mountain. The holes branch at 100-ft. intervals from the main shaft.

In order to preserve the main tunnel for a succession of future blasts all loading of powder in the coyote holes is terminated at a point 180 ft. from centerline of the main tunnels. The main tunnels and the coyote holes have approximately the same dimensions, namely 5 ft. wide by 7 ft. high. The tunnel and coyote holes are on the same level as the floor of the excavation after the blast.

A Manchas electric mule on narrow gauge track is used as a locomotive for pulling all trains in and out of the tunnel and coyote holes. The mule is powered with Mancha storage batteries which are recharged every night with a motor-generator battery charger, located at a convenient location near the entrance to the main tunnel.

Drilling for the main tunnel and the coyote holes utilizes a jumbo ahead of the electric mule. The jumbo mounts two Gardner-Denver model J2P-2576 drills which are air operated from the main compressor. Using Timken carbide insert rock bits (S-MCB CS, 1⅞ in. size), it has been the practice to drill about 27 holes in the face of the tunnel rock. These holes go in one drill steel length, 7 ft., and are loaded on the basis of securing about 1 cu. yd. or more of rock for each pound of explosive used. A normal day's run extends the tunnel 25 to 30 ft.

Remove Waste

Rock and muck from tunnel blast are removed by Eimco Rocker-Shovels, model 12B, mounted on narrow gauge trucks. The Rocker-Shovel is backed into the tunnel. It loads a muck car placed between it and the electric mule.

As the tunnel is pushed ahead, a 4-in. compressed air pipe and a 2-in. water pipe, together with the narrow gauge track, are kept closely behind. The water line is for drilling and the air pipe is for air-operated tools. Unless drilling or shooting is going on the contractor depends on the escaping compressed air as an adequate source of fresh air for the workmen. Air is blown into the tunnel using a Joy series model 21¼-14-3450 Axivane fan.

Two heavy 100-volt cables furnish electricity for lights and such electrical equipment as is used. M-K has not found it necessary to employ any special explosion-proof light-globes on this project.

Two kinds of explosives are intermingled in loading the coyote holes. About 80% is locally called "fertilizer," technically Atlas Amocol in 50-lb. bags. The other 20% is Atlas 60% Extra dynamite in 50-lb. cartridges. The safety of the loading operation has been very high due to the fact that the Amocol will not explode unless the dynamite ratio is greater than 1 to 5.

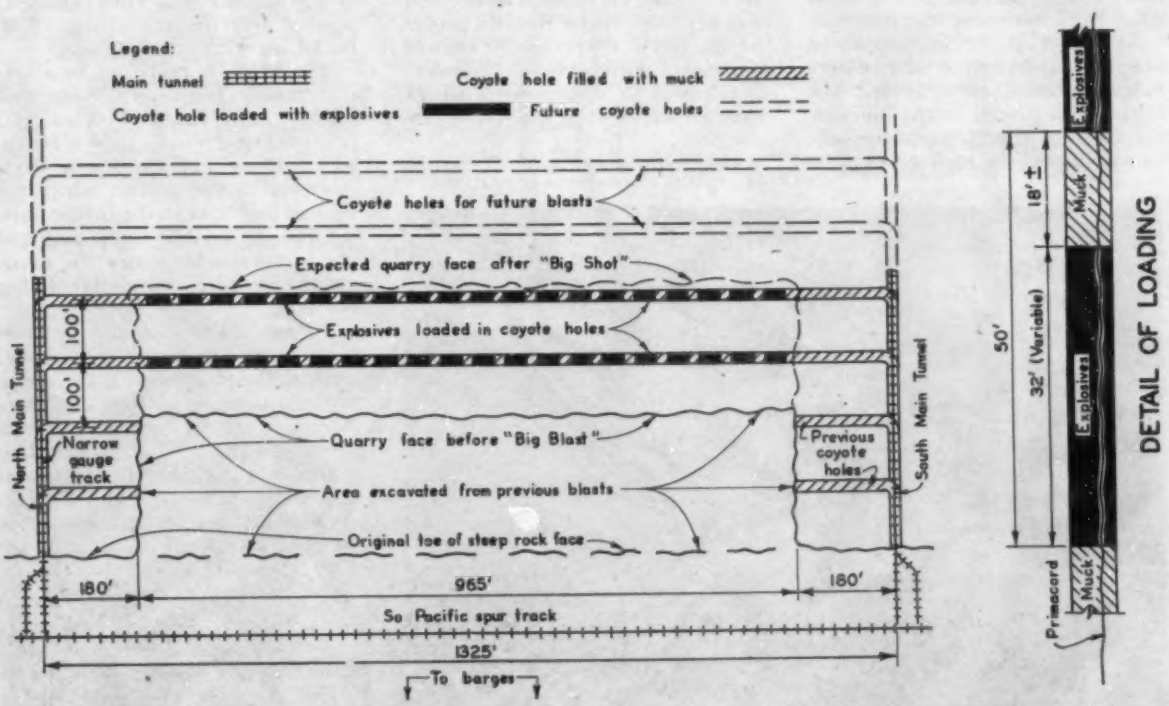
Explosives are shipped by rail from the Atlas plant at Nitro, Calif., 80,000 lb. of "fertilizer" (Amocol) or 60,000 lb. of dynamite per car. Cars are run on a spur track parallel to the quarry face and spotted directly in front of either of the main tunnels, facilitating loading operations. Normal practice is to spot the fertilizer car directly in front of tunnel. The tunnel track runs up to the standard gauge allowing the electric mule to back tunnel cars close to the box cars.

Utilizing the required number of sections of Rapid-Wheel conveyor, the fertilizer is manhandled in human chain fashion to be loaded onto explosive cars. Eighty 50-lb. bags are placed on each two-car mine train. The railroad car containing 60% dynamite is spotted a short distance from the Amocol car and is unloaded onto a flat-bed truck. The flat-bed takes the dynamite to the mine train where the two-car train is further loaded with 20 of these 50-lb. sticks.

● **Showing a standard two-car mine train load consisting of eighty 50-lb. bags of "fertilizer" and twenty 50-lb. sticks of 60% dynamite, heading into the main tunnel.**

The loading and unloading activities are under the close supervision of Bert C. Shirey, blasting superintendent. When the mine train is loaded, the locomotive engineer and an explosives handler take it into the main tunnel to a point just past the spur track into the coyote hole.

Another Manchas electric mule remains in the coyote hole to perform the switching. The mule pulls the empty cars out of the coyote hole and, by switching, picks up the loaded mine cars and pushes them into the coyote hole to the point where loading is going on. The two cars are spotted against a 10-ft. electric belt conveyor and the explosives transferred by hand. From the conveyor the explosives drop onto a 12-ft. section of Rapid-Wheel conveyor, from which handlers stack it in the coyote hole. The hole is crammed as full as



● **Author's field sketch of the coyote hole and loading details.**

● Two Eimco RockerShovels are shown back-to-back next to a muck car, awaiting use after the blast.

● Michigan loader loading a muck car for packing the charge in the coyote hole.

possible with the fertilizer and dynamite.

Loading 150,000 lb. per 11-hour day is about average, with 200,000 lb. on exceptional days.

To fire the explosives Ensign-Bickford Primacord SW Plastic is used. This is a cord in which the explosion traveling at approximately 21,000 ft. per second or almost instantaneous. The contractor purchases Primacord, the detonating fuse, in 500 and 1000-ft. rolls. The cord is strung continuous throughout the loading of the coyote holes. Cord from one roll is fastened to the next with a square knot. To fire the shot, two caps were used per cross-cut tunnel, totaling eight caps connected in series—zero delay Atlas Rockmaster for forward tunnels, No. 2 delay Atlas Rockmaster for rear tunnels.

As shown in the accompanying diagram, loading of the coyote holes is started every 50 ft. The explosive is placed in the holes on the basis of producing about one cu. yd. of rock for each 1 to 1¼ lb.

of explosives. Atlas Powder Co. has kept an expert, Ralph Conner, on the job to supervise the loading and figure out how much "powder" is required in accordance with the overburden of rock above the coyote hole.

In a typical instance, 32 lin. ft. of coyote hole was filled with explosive and the remaining 18 ft. backfilled with granular muck.

The muck is prepared by a special crusher and carefully screened for uniformity in size. This material is loaded on a muck car by a Michigan loader. The car has a screw conveyor in the bottom which fits into an unloader in the coyote hole, the fast action and steep angle of the belt unloader throw the muck on the powder completely filling the hole.

Firing shots of such size has been of interest to a great many people; scientists concerned with the earthquake aspects, explosives engineers interested in the economy of such blasts and the general public. The public was excluded from any access whatsoever to the site. Photographers and authorized spectators watched the blast from a barge 4000 ft. out in Great Salt Lake.

As with the previous large shots

● Bucyrus-Erie 150-B, electric shovel with 6½ cu. yd. Esco bucket wrestles rock into the "Eucs."

on this project, the rock was successfully broken into sizes which could be handled easily by large shovels. The blast gave the visual effect of a simple raising up and setting down of this tremendous amount of rock. No rock particles were thrown farther than a few hundred feet although, according to a newspaper report, the unexpected strength of the blast did result in some rocks flying out of bounds and damaging some power lines. After the big blast two Bucyrus-Erie 150-B electric shovels with 6½ cu. yd. buckets began loading the rock into Euclid end-dumps. The shovels after each blast start as near the top of the pile as is necessary to insure getting all the over-hand. This is so that in working on the lowest level, the danger of rock slides or big rocks falling off of the top is minimized.

The shovels then move down in successive lifts until they reach the floor of the cut. It is estimated that it will take three such lifts to move the yardage from the 1,300 x 200 ft. area of the Big Shot of July 21. A Caterpillar D8 dozer works with the shovel to keep the quarry floor clean.

Oversize rocks have been somewhat of a problem. To handle this phase of the work blasting superintendent Shirey keeps on hand an Ingersoll-Rand Gyro-Flo 600 air compressor, a Gardner-Denver Air Trac drill and two jackhammers for drilling for secondary shooting. Shirey prefers down holes in the rock as he can control the shots better and he feels that side holes tend to throw too many fragments. It is normal procedure to drill 4 or 5 holes about half way through the larger over-size rocks. The holes are loaded not too heavily in order to protect equipment from flying pieces.

● **Face of the rock cut left by previous blasts is shown being cleaned up, preparatory to the Big Shot of July 21, 1957. Note secondary drilling of a huge chunk, with air supplied by the Ingersoll-Rand 600 seen at left.**

All drill bits are sharpened on an Ingersoll-Rand JA-3 bit sharpener located in an adjacent Butler steel building, which also houses three Gardner-Denver 600 air compressors supplying the entire project. The operator who takes care of the compressor equipment sharpens bits in his spare time. He advises that he can sharpen a 1¾-in. bit in about 30 seconds and that it takes only 2½ minutes to sharpen a 3-in. bit by the JA 3 sharpener.

Morrison-Knudsen has used grinding wheels made by both Pacific Grinding Wheel Co. and Bay State Abrasive Products Co. The wheels vary from 1¼ to 2 in. in width and are 12 in. in diameter on a 1¼ in. spindle.

A feature of the Ingersoll-Rand bit sharpener which saves a great deal of time is the gauging wheel built into the sharpener. The wheel is easily operated and allows the operator quickly to perform a wheel smoothing operation as well as bring the wheel back to shape.

● **Almost perfect fragmentation was gained by the 1,790,000-pound shot.**

Borrow Pits Designed as Lakes on Illinois Road

Two sizable new lakes having recreational value will be created near Des Plaines, northwest of Chicago, from an agreement between Cook county and an Illinois toll road contractor, A.C.K. Associates.

A lake which the county estimates would have cost it $1,200,000 to create will be turned over to the county along with a payment of $108,000 by the construction company, in return for the use of earth and gravel borrow for its toll road job. One lake will cover 35 acres, another 16 acres, both part of the county forest preserve system.

A similar arrangement was made for borrow pits along the Indiana toll road in 1955; several bodies of water along that road today stand as "dividends" of the strategic planning and cross sectioning of borrow areas to cause definite ponding.

Editorial

How Much Work for Road Contractors in 1958?

How much of a start has really been made on the Interstate road program? What can contractors and equipment suppliers look to in 1958?

The recent confusion over the progress being made stems from two sources. Some have expected an impossibly fast start, despite repeated warnings that the advance engineering would take time. But mostly the trouble is due to a lack of realistic reporting. As a service to all concerned, *Roads and Streets'* Washington editor has dug out the best possible information. His special report (see pages 21-24 in this issue) represents considerable spade work.

There has been a widespread misunderstanding of the classifications used by the Bureau of Public Roads in their reporting. What apparently has confused and deceived many people are the various terms such as "programmed," "obligated" and "authorized," as used to define stages in the get-ready procedure. None of these means "projects awarded to contract." Nor does this latter term (as used particularly for interstate projects) always mean fully under construction.

Actually, when the first contract is let for a project (a highway segment which may include several contract jobs), the bureau moves the entire project into the "under construction" category. At a time when initial Interstate contracts are being let throughout the country, this procedure tends to give an inflated picture of progress.

Also the work stays in this category until the entire project is finaled out, so there is air at both ends.

The bureau's statistical methods are, no doubt, necessary to its internal management and accounting. What the industry needs, however, is not just a set of paperwork figures on what the bureau has accomplished, but rather the facts or what the state highway departments and their contractors are doing. How much is being spent for engineering? How much for right-of-way? How much paid to contractors? How much scheduled for awarding in the month or quarter ahead? In short, down-to-work statistics on which machinery makers, material suppliers, contracting firms and their subs can review recent progress, observe the current trend and plan their own business operations.

The AASHO through its committees could help the bureau develop a plan for gathering such statistics and quickly making them available on a monthly cumulative basis. The statistics should include realistic estimates of dollar expenditures anticipated in each period ahead, as well as sums actually spent in the period just past.

As our special report emphasizes, some states are well out ahead. The big Interstate program-within-a-program is beginning to roll. The 12-year unbroken climb in road construction volume will steepen and by another year the whole nation will feel the economic impact of the roadbuilder's work as never before. But meantime it will certainly help a lot to know more definitely what's what—if for no other reason than to show certain legislatures what a sorry progress their states are making in comparison to the ones that are out in front.

Costly Maintenance Neglect

The recent financial fiasco in Arkansas where the letting schedule came to a halt and many contractors have remained unpaid, has another aspect which will also cost the Arkansas people very heavily.

As part of the financial pinch, the state highway department announced in August that it had to lay off 500 maintenance employees. Admitting that some of this work is seasonal, this still raises the question as to which of two evils is involved here—whether a heavy surplus of unnecessary workers had been on the payroll all along, or whether maintenance will be neglected and many miles of costly roadbed allowed to go to pot.

In past decades. Arkansas has lost untold millions of dollars in gross and dismal neglect of maintenance. Those who drove through the state during the war still recall the miles upon miles of concrete slab which were in an advanced stage of deterioration because of prolonged lack of maintenance.

An editorial in a recent issue of Life magazine singled out California and Texas as two of the finest highway departments and Arkansas and Indiana as recently having two of the politically worst. This widely read magazine performed a real public service in bringing to the fore the fact that the road program must and can be handled with political courage and foresight. No state's segment of the $100 billion road program will be handled efficiently unless the people elect a governor and a legislature which will provide the money, the legal tools and the leadership.

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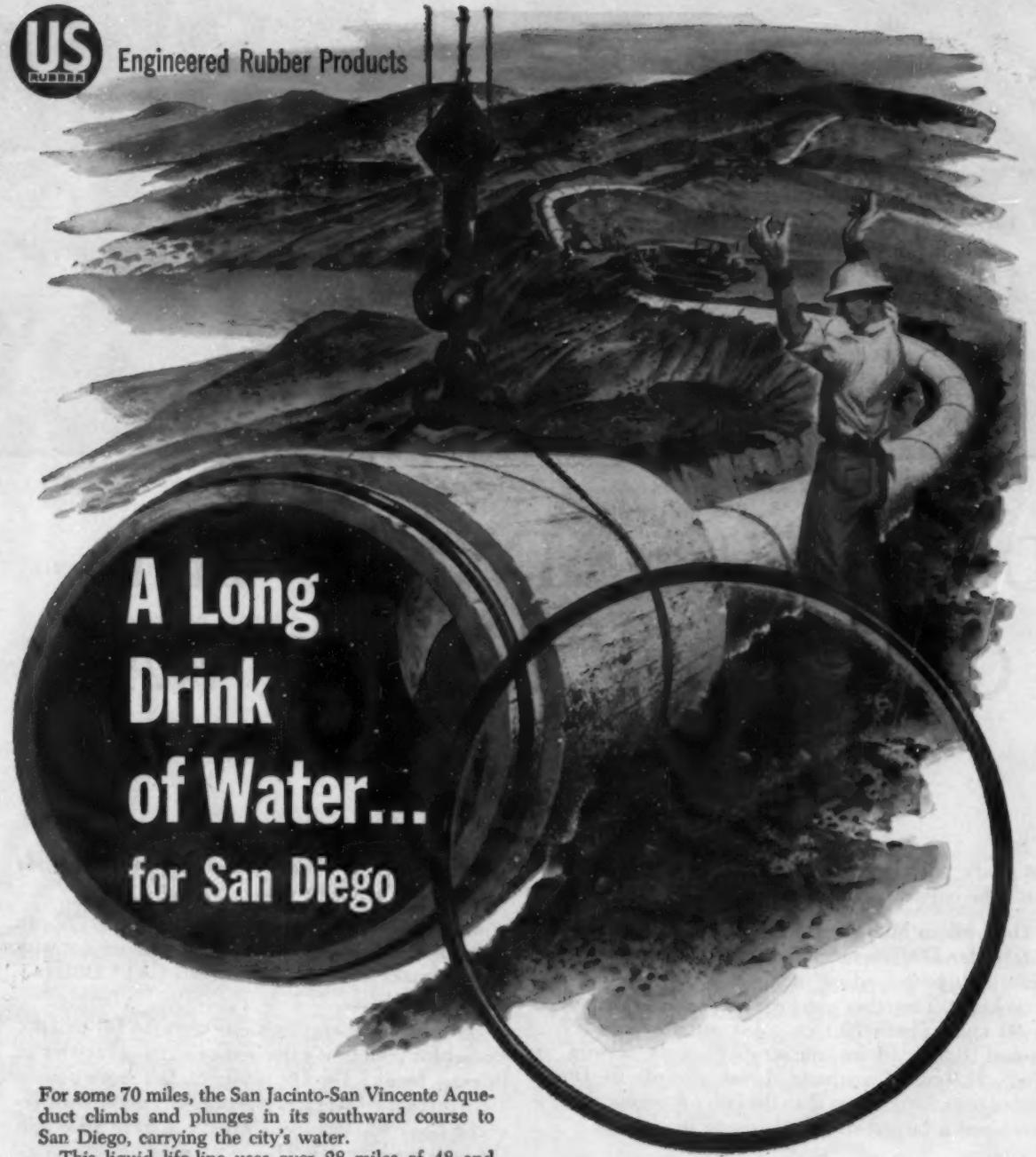

A Long Drink of Water... for San Diego

For some 70 miles, the San Jacinto-San Vincente Aqueduct climbs and plunges in its southward course to San Diego, carrying the city's water.

This liquid life-line uses over 28 miles of 48 and 54-inch reinforced concrete pressure pipe equipped with steel joint rings.

These steel joint rings—about 8,500 in all—are sealed with U. S. Rubber round gaskets, made by the unique process of *continuous molding*. This process is exclusive with U. S. Rubber. Continuous molding produces the only seals that provide minimum compression set, precise tolerances (down to .008 if needed), and long life —all at reasonable cost.

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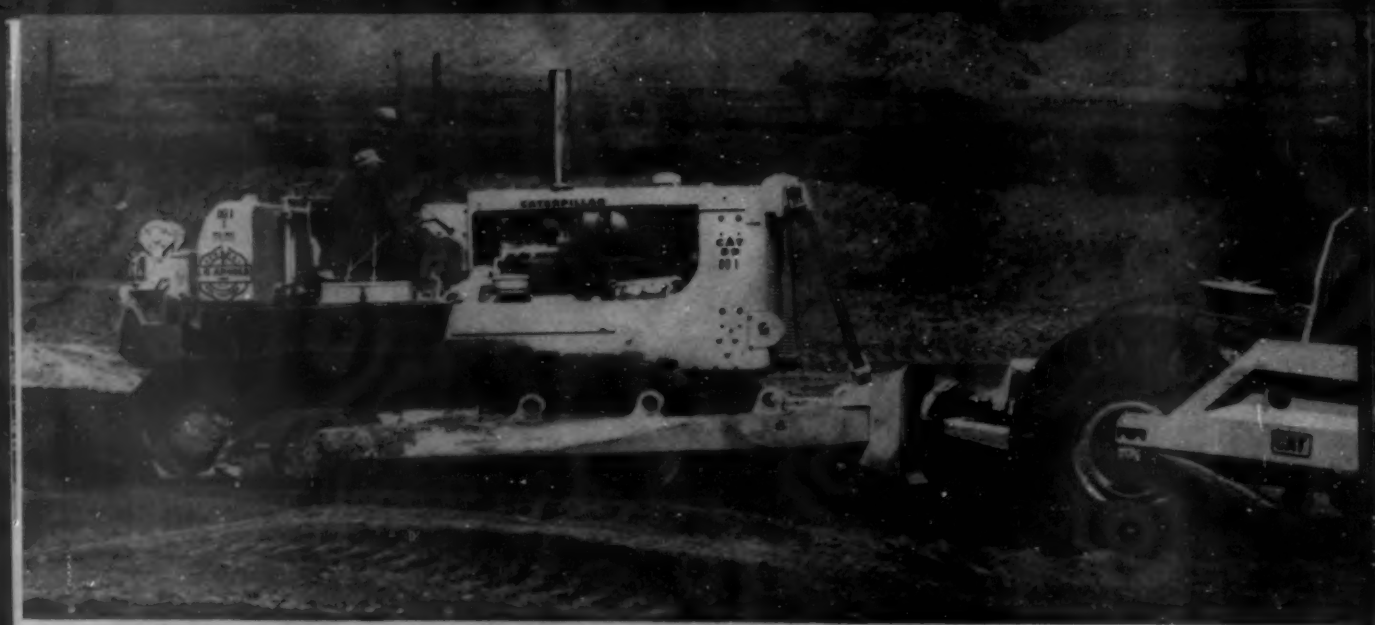


DOES THE KING OF THE CRAWLERS PAY ITS WAY?

Let's talk push-loading. We'll use some figures—that's the only way to tell a dollars-and-cents story.

On a job in Munsing, Michigan, not long ago, a Caterpillar D9 Tractor and a competitive machine were both push-loading in moist sand with some gravel in it. The other machine loaded 18.3 cu. yd. in .91 min. That's 20.1 cu. yd. a minute. The D9 pushed 18.5 cu. yd. into the scraper in only .58 min. That's 31.9 cu. yd. a minute. In other words, the D9 loaded over 50% faster than the other machine, and developed a larger load while doing it.

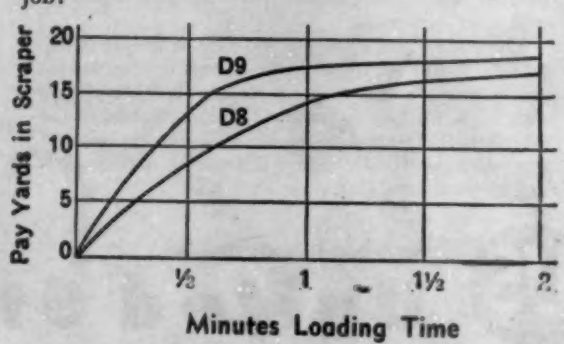
In Belmont, N. C., a D9 and a different competitor were push-loading in sandy clay. The other machine handled 15.3 cu. yd. in .67 min. Or 652 cu. yd. an hour. The D9 handled 17.2 cu. yd. in .42 min. Or 860 cu. yd. an hour. This was a half million cubic yard job; the D9 could have completed it in 3½ weeks less time than the other machine.

On a job in Minot, N. D., on another in Atlanta, Ga., the story was much the same.

Compare a big yellow machine with another big yellow machine

Maybe the best way to spell out how the D9 can boost profits is to compare its performance not with another make but with this famous CAT* D8 Tractor.

Owners and operators know what the D8 will do. Pound for pound, it's the best-producing crawler in its class today. The D9 is bigger, has more power. Does this added size and power really make a difference? Look what happens when you have a D8 and D9 both pushing DW21-No. 21 units on the same job:



D9 push-loads DW21 with No. 470 Scraper on highway job in Wisconsin. Ten-mile job calls for handling 120,960 yards, mostly sandy gravel. D9 loads DW21 in gravel in 70 seconds here, with heaping loads up to 25 yards. Vice President F. L. Carr of L. G. Arnold, Inc., says, "The D9 pusher has more than lived up to our expectations." Grade Superintendent Phil Dudenhoefer adds, "Outproduces by far any other machines on the job."

Forget size, weight, horsepower. Forget toughness and agility. These only point to what counts most: out on the job, how does the D9 really stack up against competition in cost-per-yard?

Or compare these two big yellow machines this way. Say on a job your haul distance averages 1,875 feet and you're using three DW21-No. 21s with one pusher. If that pusher is a D8, you stand to average 344 yards an hour. If it's a D9, you'll get 412.

Now, say your spread is made up of the pusher and the three wheel units, plus a No. 12 Motor Grader and another crawler with 'dozer and roller. Figure your hourly owning and operating cost. Count in the depreciation, taxes, gas and fuel, lube oil, grease, repairs and labor, and operators' wages. If your pusher is a D8, a reasonable figure for the spread would be $73.52 an hour. If it's a D9, your costs could come to $77.32. But remember, you're getting 344 yards with the D8, and that comes to 21.4c an hour per yard of dirt. With the D9, you're getting 412 yards at $77.32 an hour—which figures out at 18.7c per yard of dirt.

The D9 would save you 2.7c per yard, *and* give you 68 more yards, each and every hour.

Naturally, these figures might not exactly match your own. But they are figures based on actual performance records and they tell an honest story.

Would the D9 make more money for you?

There are jobs that would not warrant a D9. With the rugged D8 available, there may be no need to call in the 29-ton, 320-flywheel-HP D9. But the above figures certainly prove this much: on job after job, the D9 *is* paying its way, no matter how close the records are kept. One of these jobs could be yours.

But don't just take our figures for it. Call your Caterpillar Dealer. Have him demonstrate the D9 on your job. Check it with *your* watch, in *your* dirt, against *your* books. *That'll* tell the tale.

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Lima Type 44-T truck crane, equipped with a 30′ boom, placing concrete on a new junior high school building, Dallas, Texas.

What Was Said at the Congressional Hearings on—

Concrete vs. Asphalt for Military Airfields

Contractors as well as supply industry spokesmen gave testimony in Washington for and against the Air Force's "all concrete" policy for heavy-duty military airfield pavement. Kelly Field test came under additional fire.

Roads and Streets Staff Report

THE RUNNING controversy between asphaltic and portland cement concrete interests flared into the open again recently at a Congressional hearing on the respective merits of the two paving types for military airfields. With millions of dollars worth of future airfield pavement construction at stake, both branches of the supply industry were vitally concerned. So were the great many paving contractors who bid on airfield work.

The Air Force, under attack for its alleged partiality for portland cement, stuck to its claim that asphaltic concrete pavements were breaking up under modern heavyweight planes. Asphalt spokesmen countered with charges that the arbitrary policy of specifying one type of material only is unwarranted and extremely expensive.

Congress has challenged the Air Force in this matter on previous occasions. Early in 1954, the subcommittee for Special Investigations of the House Armed Services Committee questioned the Air Force practice of allowing portland cement a 5% premium over asphalt pavement for runways. At that time the Air Force admitted that, although it was "completely convinced" of the advantages of rigid-type pavement, it was unable to back up this opinion with comparative maintenance costs. The committee at that time asked the Air Force to discontinue its policy of favoring portland cement concrete for pavement except in certain areas where it was agreed jet planes damaged asphaltic concrete.

In spite of this action, however, the Air Force in 1955 began to order p.c. concrete exclusively for primary taxiways and early in 1956 the chief of Air Installations reported that the Air Force was essentially operating a portland cement concrete paving program.

It was to review this policy that the House investigating committee called the hearings last month.

A parade of witnesses came forward to attack or defend the Air Force's policy—paving contractors, top research engineers from the Corps of Engineers, the Asphalt Institute, the Portland Cement Association and the National Bituminous Concrete Association. Many attacked the reliability of the Kelly Air Force test, an accelerated traffic test of both rigid and flexible pavements which, Air Force officials claimed, established the superiority of portland cement concrete.*

John M. Ferry, the Air Force's special assistant for installations, told the committee that bituminous pavements have given considerably more trouble than rigid pavements. He claimed 47 instances where major repairs or replacements were necessary because of "channelized" traffic of heavy aircraft, jet engine heat blast damage and jet fuel spillage. Because of such failures, particularly under channelized traffic, the Air Force has been forced to specify portland cement construction for the great bulk of airfield pavement, he said.

Mr. Ferry pointed out that modern heavy bombers have boosted loading from 100,000 pounds on dual wheels to 240,000 pounds on twin-gear, and pavements should be designed for up to 30,000 passes—or 20 years' life. Also pavements must be smoother, to avoid up-and-down sway which puts delicate equipment out of order.

In its attempt to win back the

*See "Status of Flexible Pavement Design for Military Airfields," by A. S. Wellborn, and "An Asphalt Engineer Analyses Kelly Field Pavement Failure," by Paul E. Blouin, *Roads and Streets*, April 1957. Also "The Challenge," by H. G. Nevitt, *Roads and Streets*, May 1957.

New Test Planned

As we go to press, the Air Force has just announced that it will authorize another test of asphaltic concrete pavement to "conclusively" determine if an adequate design has been developed to bear 250,000-lb. loads. In agreeing to sponsor the test, Maj. Gen. W. K. Wilson, Deputy Chief of Engineers for Construction, repeated his complaint that asphalt pavements are failing under heavy plane traffic and the Air Force has no choice but to specify portland cement concrete. The new test will be conducted by the Army Corps of Engineers at Columbus, Miss. The Air Force's previous accelerated traffic test—the Kelly test—was largely discredited in congressional hearings last month.

ASPHALT CONSULTANT MAKES STRONG CASE

One of the most lucid statements presented during the controversial hearings on concrete vs. asphalt airfield pavements was that of Warren B. Warden, owner and manager of the reputable firm of consulting engineers, Miller-Warden Associates.

Mr. Warden went beyond the immediate effect of the Air Force's preference for portland cement concrete to the long-range results of such a policy. Drawing upon long experience with both types of pavement, Mr. Warden testified that:

- Flexible as well as rigid pavement *can* be constructed to satisfactorily serve the operating demands of the Air Force.
- The initial cost advantage of asphalt must be recognized, that from 1½ to 2 times as much asphaltic concrete pavement can be constructed as portland cement concrete for the same number of dollars.
- Rigid-type pavement is subject to failure from overload as well as flexible type, and the repair of damaged asphalt pavement is generally less costly.
- Maintenance costs are probably about equal.
- The cost of strengthening existing pavement to bear heavier loads may be substantially less where it is of asphalt construction.

Moreover, Mr. Warden pointed out, the exclusion of asphalt from military airfield specifications would seriously jeopardize a healthy competitive situation. The steady development of improved asphalt paving techniques, equipment and material would be deterred. Asphalt research and design would lag. And the Air Force itself would suffer the loss of a flexible process, particularly advantageous in time of emergency.

"Asphaltic concrete and portland cement concrete pavements are competitive from both a service and maintenance standpoint," he opined, "and there is a definite economic disadvantage in excluding asphalt from military airfield construction."

He recommended that the military specify only realistic service requirements for airfield paving and "give our American free enterprise system full and uninhibited rein to meet those requirements both now and in the future."

"Findings" Not Applicable to Highways

Warden has warned highway engineers following the airfield hearings against applying testimony heard there to highway design. He pointed out there is "no comparison" between the loadings to which airfield pavement is subjected and highway traffic.

"The findings of these hearings and the statements made relative to the issues involved in the construction of military airfields may influence those concerned with deciding the type of pavement to be used on civil airports. They may particularly affect thinking by designers on the vast highway program now under way—one part of which involves some 40,000 miles of the Interstate system to be paid for 90% from Federal funds.

"It should be made perfectly clear to all that inferences from these discussions and the opinions expressed in these sessions apply only to extremely high wheel loadings, channelized repetitions, etc., for military jet planes. The discussion has no bearing whatsoever on the design criteria or anticipated service for highway vehicular traffic or for lighter planes."

multi-million-dollar paving market lost to the Air Force, asphalt interests presented an aggressive case at the committee hearings. In a heavily documented report, the Asphalt Institute attacked the Air Force policy with these arguments:

- That the elimination of asphalt from competition has boosted paving prices significantly.
- That in not a single case of alleged asphalt concrete failure had the pavement been designed for the channelized traffic it was subsequently subjected to.
- That the Kelly test, which the Air Force claimed substantiated their preference for portland cement concrete, was not a fair test of asphalt.
- That asphalt design has advanced to the stage where pavements can be designed for the heaviest loadings.
- That the Air Force could not afford to ignore the cost advantages of asphalt construction.

The Portland Cement Association supported the Air Force with a review of the advantages of the material.

It is "the only pavement suitable for all areas on military airfields," PCA flatly asserted.

Warning against false economy, association president G. Donald Kennedy pointed out that of a total cost of $100 million for a new air base, only about $17 million (17%) went into pavement. It has been agreed, he said, that rigid pavement should be specified for the "critical" areas which compose 80% of this pavement. So, in essence, the argument for and against portland cement involves only the other 20%—about $3.4 million worth of construction, or 3.4% of the total cost of an air base.

Difference Is Small

Even if portland cement concrete costs more, he argued, the difference is small when compared to the total cost of the airfield or the cost of the planes whose safety depends upon high quality runways and taxiways. (A single heavy bomber costs $8 million.)

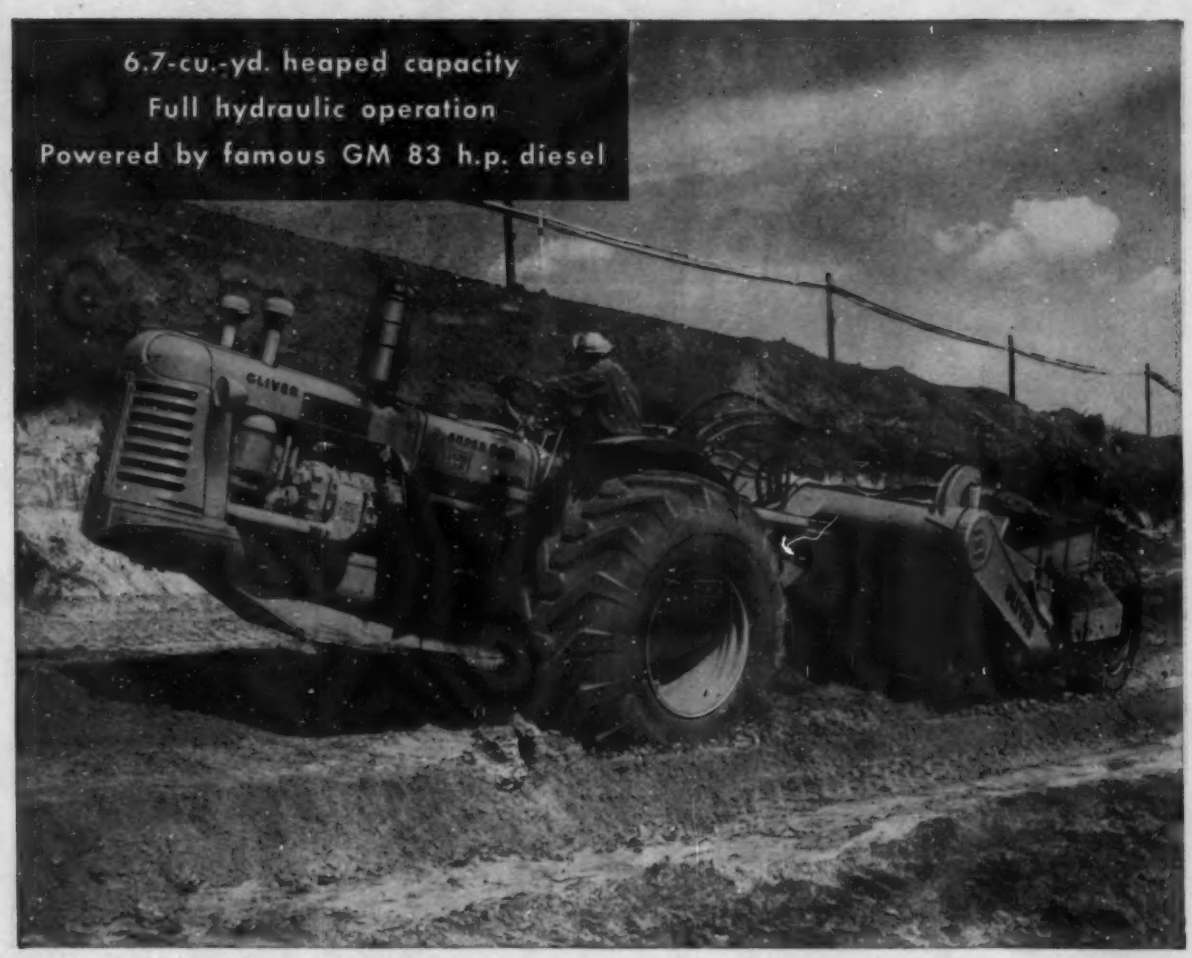
Skid resistance, visibility, strict surface alignment and absence of loose particles are all characteristics of portland cement concrete which make it the most desirable paving material, Mr. Kennedy said.

The Corps of Engineers, which construct air bases for the Air Force, testified that 71 million square yards of new pavement has been built since 1952 at a cost of $400 million (paving only). About 63% of this pavement has been the rigid type.

The Corps declared that the major factor in the failures reported by the Air Force was "channelization" and that this form of overloading had not been provided for in the original design of the pavements. Coming to the heart of the controversy, the Corps admitted two important points:

- That channelized plane traffic concentrated six times the number of load repetitions on parts of the pavement than that which was assumed in their design.
- That such sections actually represented only 10% of the total pavements at a given airfield. Presum-

(Continued on page 64)



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Rapid Step-Up in Wheel Loadings

Some of the urgency under which airfield pavement designers work was borne out in the hearings. Only three years ago, the largest plane in use (the B-47) weighed 200,000 lb. and exerted 100 psi tire pressure. Today's heaviest plane weighs 460,000 lb. and exerts 240 psi on the pavement.

Contrary to earlier belief, greatest impact is not in landing a big plane, the engineers reminded, but in slow taxiing of the aircraft.

CONCRETE VS ASPHALT

(Continued from page 60)

ably, asphaltic concrete could serve adequately in the other 90%.

The Corps really "sewed up" the case for asphalt in the minds of many of the congressmen when it revealed that asphaltic concrete pavement has recently been developed which will bear channelized traffic.

Other witnesses bore out the fact that asphalt design criteria have lagged behind those for portland cement concrete and that this is the real reason behind the apparently more failures in the former when both have been subjected to the new, heavier planes. The Corps claimed it has confidence in its new pavement design for B-47's and is on the verge of announcing criteria for pavements which can carry the huge B-52's. This development will bring asphaltic concrete design criteria up to those for portland cement concrete, it is expected.

Four prominent asphalt contractors appeared before the committee to appeal the Air Force policy of "discrimination" against asphalt for 80% of its airfield pavement market.

John W. Kerr of Imperial Paving Company, Oklahoma City, assailed the high cost of portland cement concrete on Tinker Air Force Base compared to the cost of asphaltic concrete. The former cost $7.35 per sq. yd., the latter, $3.91 per sq. yd., he said.

Alleges Waste

"If the cost experience at Tinker Air Base is typical, then building airfield pavements from other than flexible bituminous pavement in this portion of the country (Oklahoma) would be an extravagant waste of money."

H. S. Kerr, vice president of the H. B. Zachry Company of San Antonio, sought to discredit the Air Force findings from the Kelly test.

The Zachry firm built the test strip and later resurfaced it after the test. Mr. Kerr felt that the accelerated test was too severe and not representative of actual traffic conditions.

The failure of asphalt pavement at Altus Airfield in Oklahoma was obviously because of under-design for future traffic, Al Kavanaugh, president of Metropolitan Paving Company, Oklahoma City, told the committee. Some 329,000 sq. yd. of asphaltic pavement which his firm laid was later replaced with portland cement concrete, he said. This was a superfluous move which cost $3 million, Mr. Kavanaugh declared. The minor failures, he observed could have been repaired for $50,000.

The National Bituminous Concrete Association, claiming to speak for the 1,500 contractors who bid for asphalt paving jobs, also appeared before the committee. With the aid of a nationally famous consulting firm (Miller-Warden Associates) and New York public relations counsel (Frank Schwartz & Associates), the association mustered a mass of engineering and cost data in favor of asphaltic concrete pavements.

More Contractors

"Time and time again it has been demonstrated that if options are permitted on government bids, many more contractors bid and the cost is less," H. Keith Griffith, executive director of NBCA told the Congressmen. He maintained that the Air Force's own records showed an average cost of $3.67 per sq. yd. of asphaltic concrete, compared to $6.89 for portland cement concrete. Repair costs are also proportionately higher, he said, citing work at Mountain View Air Force Base in Colorado, as an example.

(In this case, replacing and repairing 8,473 sq. yd. of portland cement concrete pavement cost $126,300—an average of $14.90 per sq. yd.—compared to 134 sq. yd. of asphalt concrete pavement repaired for $550—an average of $4.08 per sq. yd.)

NBCA charged that elimination of much asphalt from competition since December 20, 1955, has cost the Air Force an excessive $26 million. And if asphalt is barred in non-critical areas for the next three years another $28 million will be lost, Mr. Griffith insisted.

Asphalt paving contractors have been hurt in the policy shift where the Air Force has renegotiated bids to substitute p.c. concrete and where asphalt concrete options have been withdrawn from bids after advertising and where asphalt as an optional material has been omitted, he said.

Boasting the acceptability of asphaltic concrete, Mr. Griffith maintained that "every alleged asphalt failure made public was traced to other factors." Poor design, construction, or maintenance and poor coordination between aircraft research and pavement design were responsible for the distress areas which the Air Force cited to support its stand, he said.

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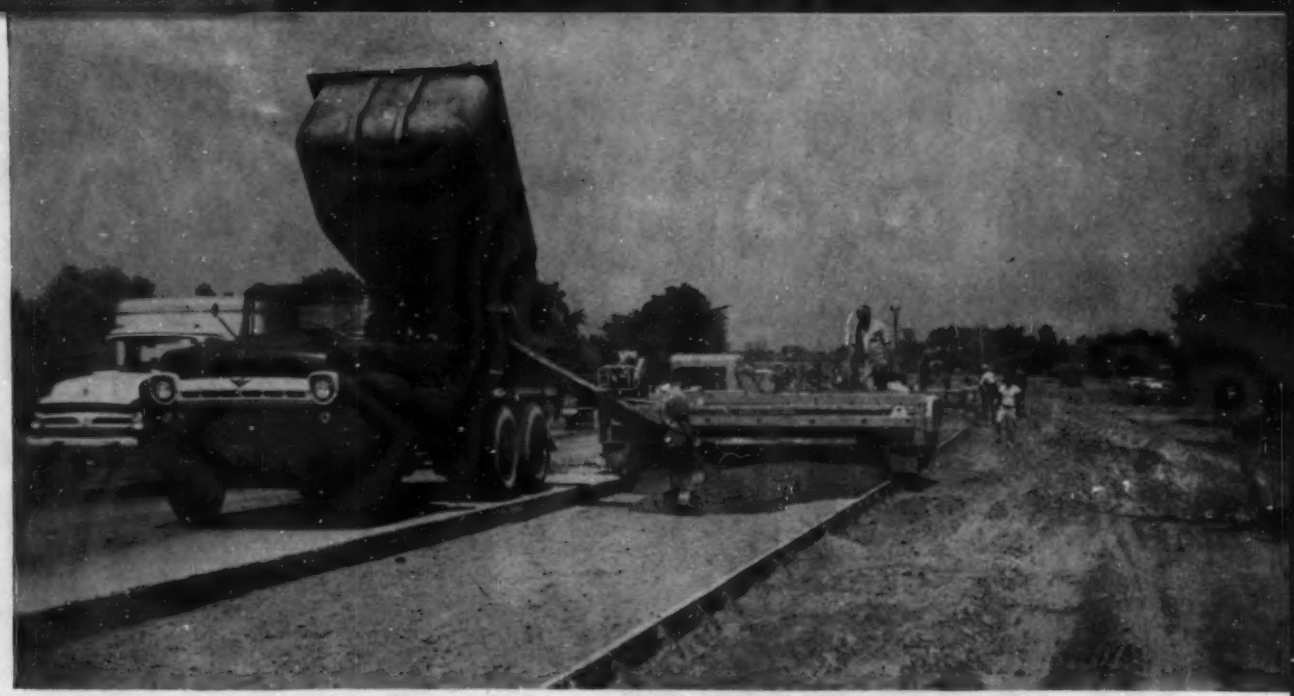


● Concrete delivery in progress, working from the old inner lane, while traffic moves on the outer lane—this strategy worked for Cooke Contracting Co.

Dump-Body Concrete Delivery

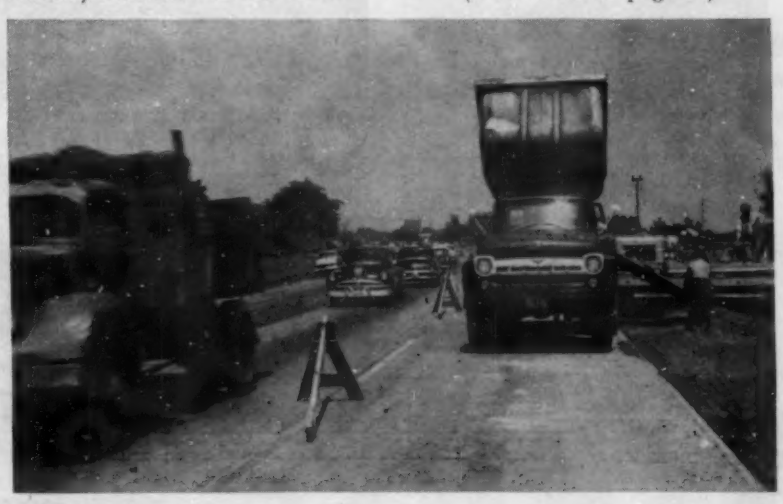
Helps Pave Third Lane Under Traffic

Cooke Contracting Company made good progress on Industrial Expressway widening project near Detroit, despite 12,000 vehicles daily traffic flow through job. Adroit scraper work expedited shoulder removal ahead of paving.

IF YOU HAD the job of constructing a new inner third lane along each roadway on one of the nation's busiest suburban expressways, how would you go about it?

In the case of a 7.7-mile segment of the Industrial Expressway on the Detroit fringe, the contractor, with state highway department approval, chose central mixing and dump-body delivery of paving concrete. Six Mason Dumpcrete bodies of 5.6 cu. yd. capacity, mounted on Ford F-800 trucks, were used by Cooke Contracting Company, Detroit, in placing 103,000 sq. yd. of 12′ x 9″ mesh-reinforced concrete. The work actually comprised about 15½ lane-miles, placed by working through the project on one roadway and back on the other.

The paving schedule was planned to comply somewhat with *(Continued on page 68)*



● Another view of the concrete placing operation. Trucks did no backing.

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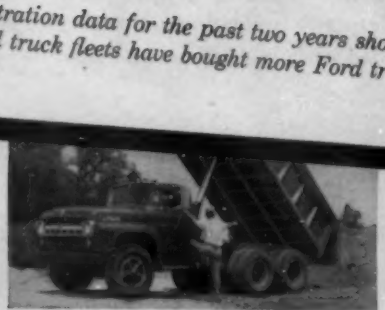

GLASSCOCK BROTHERS
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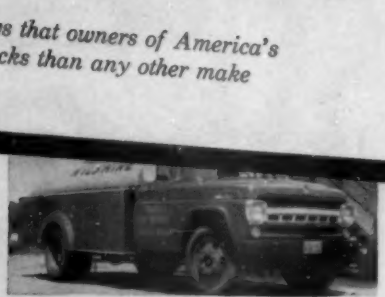

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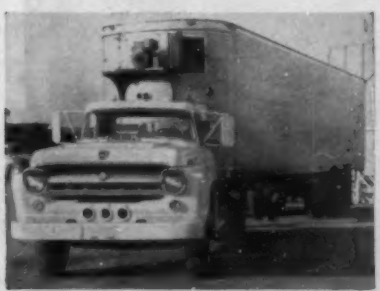

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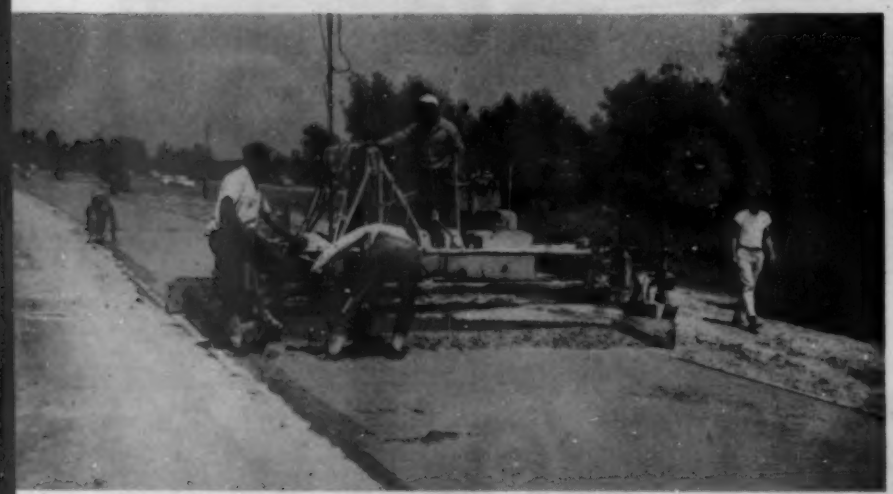
● Maxon Dumpcrete trucks taking on concrete from stationary Worthington 34E dual-drum paver.



● A Heltzel finisher was the only mechanical finishing unit on the Detroit Industrial Expressway job.

● The sand subgrade was given final blading by grader towing a form-riding screed. Adjacent lane used by concrete trucks after dumping.

DUMP-BODY DELIVERY

(Continued from page 65)

a time schedule of bridge deck repairs. These repairs were performed in advance by maintenance crews of the Wayne County Road commissions and the state highway department. As part of the traffic handling strategy, the various stages in the job, beginning with removal of the existing inner shoulder, were compressed into a distance usually not exceeding two miles. The inner lane of the existing 2-lane pavement was blocked off by cones, signs and flagging only along segments where required to protect job operators. The one-way traffic was permitted to use the graveled 8-ft. outer shoulder when necessary, to provide for 2-lane flow when movement was too heavy for one lane.

In conformance with this scheme, the inner lane of existing pavement was coned off to a point a few hundred feet ahead of concrete paving. The Dumpcrete trucks entered the inner lane at the point of beginning of the day's pour, or not to exceed about 1,500 ft. back of the pour, paused briefly to discharge their batches, and then proceeded to the nearest underpass for circling back to the plant via the opposite roadway.

One or two concrete trucks were dumping at any one time. The concrete was struck off below the form tops by a Blaw-Knox spreader with Jackson vibrator units mounted on the rear. Continuous wire mesh reinforcement was then placed and concrete dumped for a top spreading pass. Finishing was

(Continued on page 70)

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• Bulk cement delivered by Mack truck with Fruehauf trailers.

• Some of the truck-semitrailer-trailer combinations which delivered stone and sand for batching—typical of the double-dump outfits which have evolved for long hauls in the Detroit Metropolitan area.

crete was produced by a Worthington 34E dual-drum paver, located on a mound immediately adjacent to the batch plant. The paver chuted to the hauling units. Despite traffic control problems and other job elements, progress with this outfit averaged one-half mile of lane per day or better, a typically good 9-hour run consisting of 696 batches or 3,650 sq. yd. About 30% of the yardage in the job was placed at night to meet fast schedules and take advantage of light-traffic hours.

This highway is part of the expressway, built in great haste in 1939 for access to Ford's much publicized Willow Run bomber plant west of Detroit. The steel-less concrete slab was matched in designing the new third lane, only to the extent of matching joint locations. The new slab has expanded wire reinforcement, and formed joints at 30 ft. intervals. The concrete is a 5-bag mix designed as a base under the asphaltic resurface. A truscon trucure application was made from a spray cart. The contractor's operations in advance of paving were routine except for the inner shoulder removal and grading for the third lane, which began with a neat example of team play between three scraper operators. Manning D Tournapulls, the operators chewed out the old shoulder and moved materials laterally to

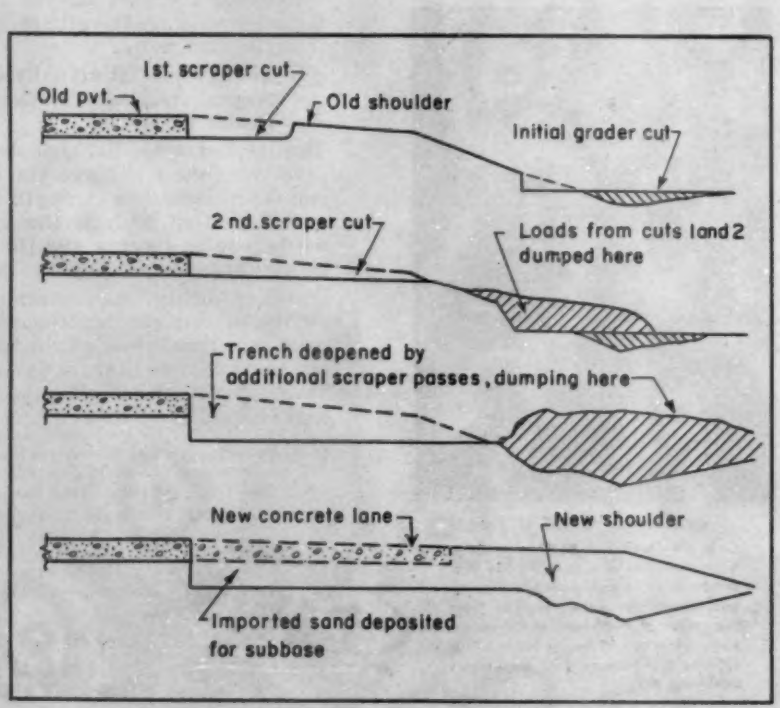
(Continued on page 72)

DUMP-BODY DELIVERY

(Continued from page 68)

done with a Heltzel unit. No bull-float was required under Michigan standards for concrete base. The widened pavement was later given a full-width 2-course asphaltic surface.

Concrete materials were batched in an assembly of Cooke-owned equipment consisting of a Blaw-Knox 100-ton stone batcher, B-K 100-ton sand batcher, a Butler automatic cement dock totaling 600 bbl. capacity, with a P&H 1½-yd. clamshell crane on stone and a Lorain ¾-yd. on the sand. Con-


1st. scraper cut
Old pvt.
Old shoulder
Initial grader cut
2 nd. scraper cut
Loads from cuts 1 and 2 dumped here
Trench deepened by additional scraper passes, dumping here
New concrete lane
New shoulder
Imported sand deposited for subbase

• Steps in cutting away old inner shoulder, moving material out to new position, and building base for shoulder for new third lane. (See picture sequence on opposite page.)

Step-By-Step: Agile Scraper Teamwork...

1 Three D Tournapulls were employed by Cooke Contracting Co. to tear out and move existing inner shoulder material. Here, initial cut is being made immediately alongside pavement slab.

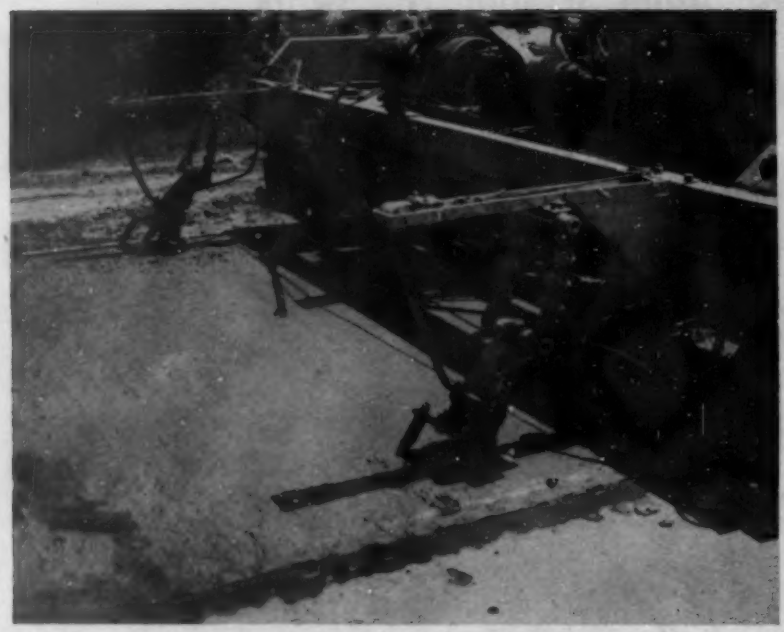
...Does Most of Shoulder Rebuilding Job

2 Second cut being made outside of first cut, using Allis-Chalmers HD-5 as pusher. This attained full-width scalping of the shoulder.

3 Tournapull spreading material on new outer position, to build up base for relocated shoulder. Second machine waiting to move in quickly.

4 Scraper on empty return is skimming with blade at an angle, to cut down shelf-edge left by the pioneering grader cut (see sketch).

5 In wake of scraper operation, after dozer has cleaned up the trench. New sand dumped for subbase for third lane.



● Jackson side-form vibrators were mounted on the rear of the spreader. A Jackson vibratory screed was also used on this job.

DUMP-BODY DELIVERY

(Continued from page 70)

start a build-up of the new shoulder, working somewhat as follows:

(1) With pusher help from an Allis-Chalmers HD-15 dozer, a Tournapull operator took a cut in the shoulder gravel immediately alongside the existing pavement slab.

(2) While waiting for the next scraper to come up, the dozer operator momentarily did everything he could to set the stage for getting the next load out quickly: he shoved up a mound of loose material on which to begin push-loading, dragged his blade to smooth the loading path, etc. Mostly, however, he was busy push-loading.

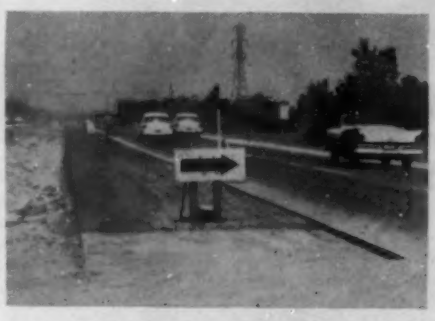
(3) The second scraper operator took a cut outside of the first cut. This accomplished a full-width scalping of the shoulder to an irregular depth of perhaps 3 to 7 inches—all done without any need for scarifying.

(4) The third scraper then came in and made either a clean-up or deepening pass, or tackled a new section of top crust ahead, depending on the situation. The scrapers thus progressed in an informal continuing cycle.

(5) Each scraper meantime turned sharply, came back in the depressed median area, and while traveling toward the rear, dumped its load to form the bottom layers of the new inner shoulder. Scraper loads were placed on a flat shelf formed some time previously by two deep passes of a motor grader; the grader cut served to convert the lower

(Continued on page 78)

Some of the Special Signs on Widening Job



● Arrow positioned to keep traffic off of partially paved inner lane.

● One of several varieties of portable signs employed by Wayne County road commission to help direct traffic on the far roadway from the paving work. These signs were part of a planned traffic maintenance strategy, devised primarily for protecting advance repair work on bridge decks.

On Yazoo River Basin Project, Yazoo County, Miss.

PIONEER GETS HIGH PRODUCTION FROM CAT* LOWBOWL SCRAPERS

DW20-NO. 456 LOWBOWL SCRAPER is push-loaded by a giant D9 Tractor. LOWBOWL design loads more material with less resistance clear to the end of the loading cycle for quicker heaped loads.

DW21-NO. 470 LOWBOWL SCRAPER speeds heaped load on haul. Turbocharged 6-cylinder Cat Engine, also in the DW20, delivers 300 HP (maximum output)—power aplenty for working in tough conditions.

At the time these pictures were taken, Pioneer Contracting Co., Inc., Memphis, had completed 100 working days of a schedule calling for 600. The project, involving 2,045,000 cu. yd. of earthmoving on the Yazoo River Basin, covers some 7 miles of work on channels, levees, drainage ditches and road relocation. There's a fleet of Caterpillar-built units on the job, including two DW20-No. 456 LOWBOWL Scrapers, a DW21-No. 470 LOWBOWL Scraper and a giant D9. They work 24 hours a day, 5 days a week. Says Pioneer's Scraper Foreman R. C. Parker: "We prefer Caterpillar-built equipment because of ease of operation. You can also depend on them for a minimum of down time. And wherever we are, Caterpillar Dealer service is always available."

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The new Greenville ripper does not interfere with push-loading operations or steering of the tractor. On this job all loading was planned to be a truck-shovel operation. The powerful bite of the ripper made

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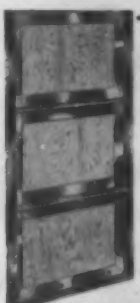

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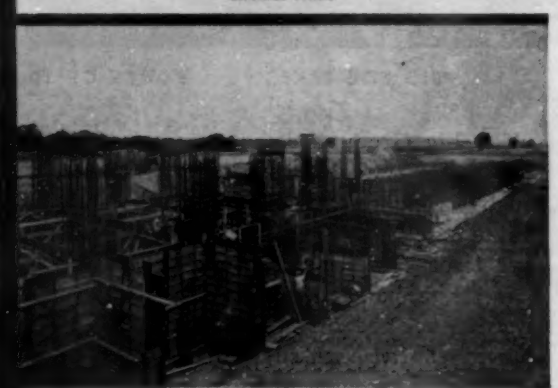

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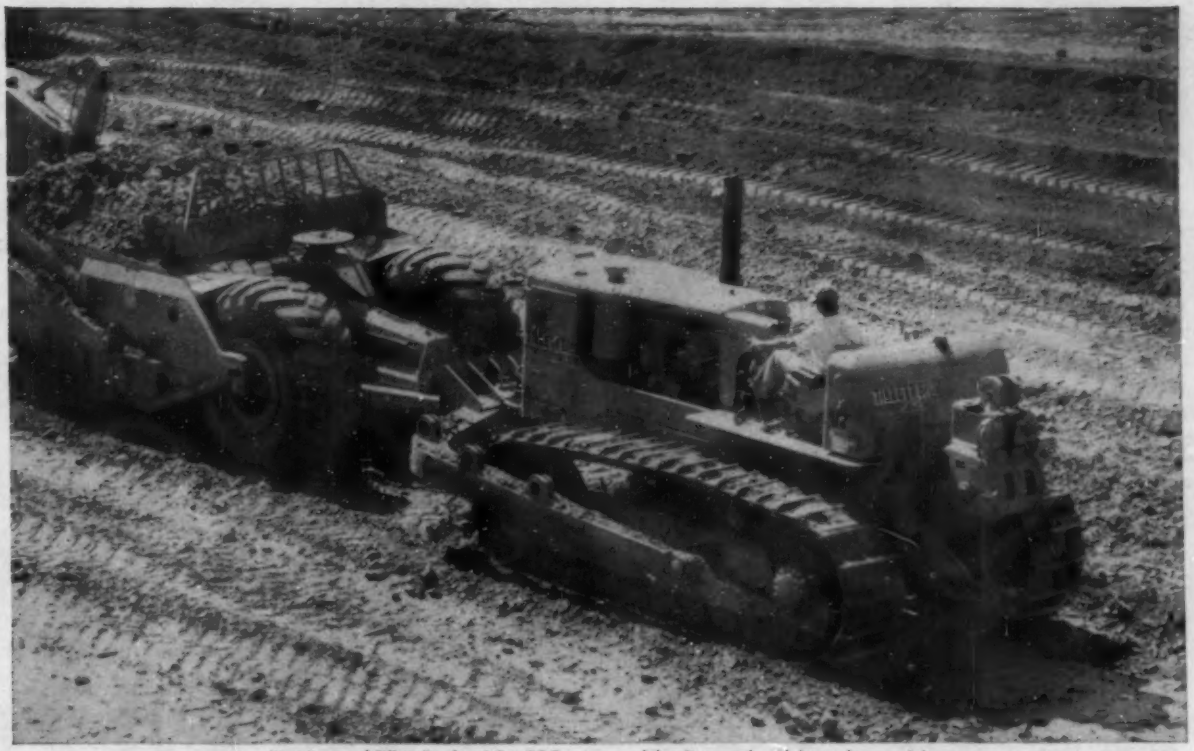

Here's one of Tillett Brothers' Cat D9 Tractors push-loading on the Alabama by-pass job. Both D9's are equipped with torque converter drives utilizing Twin Disc components.

"Torque Converter Equipped D9's save up to $600 a month,"

says Joe Tillett Jr., Tillett Brothers Construction Co.

When Tillett Brothers Construction Co., Shelbyville, Tennessee, was awarded a by-pass project just north of Montgomery, Alabama, this firm brought in, among other equipment, five Cat DW21 Tractors (two pulling No. 470 Scrapers and three pulling No. 21 Scrapers) and two big Cat D9 Tractors equipped with torque converter drives for push-loading.

Once in operation, and with the break-out pattern naturally staggered, the two torque converter equipped D9's handled all five tractor-scraper combinations—even on the shortest hauls!

What does Joe Tillett Jr., President of Tillett Brothers, think of torque converter equipped D9's? "By increasing production and reducing maintenance," says Mr. Tillett, "the torque converter drive saves about $600 a month."

There are several good reasons why leading contractors like Mr. Tillett can produce such savings from torque converter equipped machines. The torque converter, for example, multiplies engine torque up to 6:1 when required. It permits the engine to deliver constant high-horsepower output. It automatically matches power to load demands, with gear-shifting minimized or eliminated, for increased operator efficiency. Heavy load pick-up is smooth and even, without clutch slippage. Shock loads and vibrations are cushioned out through the converter's fluid connection, for long tractor life and minimum maintenance. An infinite variety of ratios is available to work with, permitting smooth, accurate control of loads.

Caterpillar Tractor Co. offers its torque converter drive as optional in D9 and D8 Tractors, and has standardized on Twin Disc Torque Converter components for these versions of the two models.

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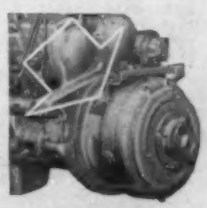

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SIEVE SHAKER

A modern, new type Laboratory Shaker that insures quick and complete sieving of aggregates.

Many other units of Engineering Test Apparatus for Concrete Testing are available. Soiltest's New Catalog covers completely all testing equipment and accessories used in this field.
Illustrated Bulletins describe Apparatus shown above.

SOILTEST Incorporated

WRITE TODAY FOR COMPLETE INFORMATION

4711 W. NORTH AVE., CHICAGO 39, ILLINOIS

EASTERN OFFICE
60 EAST 42nd ST., NEW YORK 17, N.Y.

● **Mobile GM Detroit Diesel power unit operates gates of batch plant. In rear is P&H crane with Owen 1½-yd. clamshell on stone batching.**

DUMP-BODY DELIVERY

(Continued from page 72)

reaches of the 6:1 existing shoulder slope into a flat area which helped key the new material placed in horizontal lifts, as required by the specifications.

(6) Periodically a returning empty scraper trimmed the edge of this preliminary shelf, the material falling into the shelf and contributing to the job of lateral relocation of material.

(7) A minor point, yet important, was the requirement that the maneuvering scrapers avoid all tree plantings in the median. This required some weaving but didn't noticeably slow the job. In fact the three Tournapulls worked so fast that in a few hours each day they were able to grade sufficient footage to keep ahead of paving.

(8) Imported sand was dumped, spread by dozer, bladed and rolled to form the subbase under the new lane and shoulder. Routine setting of Blaw-Knox forms then followed, with strike-off with a grader-towed Trailgrader, rolling with a 5-ton roller or an Essick vibrating roller.

The job marked Cooke's first use of the six Dumpcrete units, for which the firm sees much use.

Cooke Contracting Company was represented on the job by Anthony Soave, superintendent, under the general direction of C. E. Cooke. Norberg Totzke was project engineer for the Michigan state highway department district at Detroit, C. H. Brown, metropolitan engineer in charge.

Military Airfield Pavement Specifications Revised

The U. S. Corps, of Engineers have adopted new tolerance standards on rigid and flexible paving for use on airfield construction. On grade tolerance the engineers will establish Bench Marks at one thousand foot intervals and the elevation of the finished pavement will be checked with the plans elevation, the tolerance being 0.04 ft. Acceptance or rejection of payment will be initiated within 30 days after each thousand foot section is completed. Runways and taxways will be subject to straightedge requirements of ⅛ in. in 12′ longitudinally and $\frac{3}{16}$ in. in 12′ transversely when the transverse slope is 1% or less, or ¼ in. in 12′ where the slope grade is greater than 1%. On aprons $\frac{1}{16}$ in. in 12′ will be used in both directions except where slope grade is at a grade of more than 1% when ¼ in. in 12′ will be used.

Levelling or binder courses of flexible paving will have a ¼ in. in 12′ smoothness requirement. Straightedging must be done within 48 hours after either the rigid or flexible pavement is placed in the adjacent lane.

The tolerances do not apply to shoulders, blast areas, roads, streets and other construction of a similar nature.

. . . for more details circle 321 on enclosed return postal card

All Purpose

LIFT-LOADER

BROOM

BERM LEVELER

HUBER-WARCO MAINTAINER

The Huber-Warco M-52 Maintainer with torque converter is an all-purpose, year 'round performer, capable of outperforming many machines that are larger, heavier, more costly, slower, more expensive to operate and more limited in use. With hydraulically controlled attachments, the M-52 Maintainer will perform service as a lift-loader, bulldozer, mower, broom, snow plow, side dozer, berm leveler and patch roller. See your nearest Huber-Warco distributor for details.

BULLDOZER

HUBER-WARCO COMPANY

Marion, Ohio, U. S. A.

HUBER
WARCO

. . . for more details circle 285 on enclosed return postal card

This Bucyrus-Erie 1½-yd. 38-B shovel loads rock at the base of Mt. Franklin in El Paso, Tex. It is owned by Standard Aggregates Co., El Paso.

Bucyrus-Eries Keep Things Moving on Major Highway Jobs

On highway projects in state after state Bucyrus-Eries are the backbone of the machinery fleet. When the going gets rough, when machine maintenance becomes a problem, Bucyrus-Eries furnish the necessary dependability to keep things moving at a steady clip.

Many of their steel parts, for instance, are cast in Bucyrus-Erie's own foundries under rigid quality control; this accounts for the ruggedness that minimizes maintenance time. Fewer working parts combined through superior design enable Bucyrus-Eries to deliver highest output week in and week out.

These moneymakers are available in a complete line of crawler-mounted models from ⅜ to 4 cubic yards (including the new 1-yd. 30-B) and in rubber tired carrier mounted Transit Cranes in 15-, 25-, and 35-ton capacity. Models through 4 cu. yds. are readily convertible to crane, clamshell, and dragline, plus dragshovel on machines through 2½ cu. yds. For lighter crane work, there are 5-ton and 10-ton capacity Hydrocranes.

Your Bucyrus-Erie distributor will be glad to give you information on the size machine that fits your requirements. See him today. 333E57

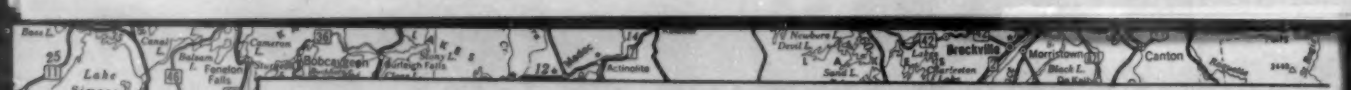
Bonus Quality Many gears, pinions, driving tumblers, shaftings, and other parts that go into Bucyrus-Eries are heat-treated in electric furnaces for specified degrees of toughness and hardness. The steel castings are poured in Bucyrus-Erie's own furnaces so they can be held to highest standards at every stage of development.

BUCYRUS ERIE South Milwaukee Wisconsin

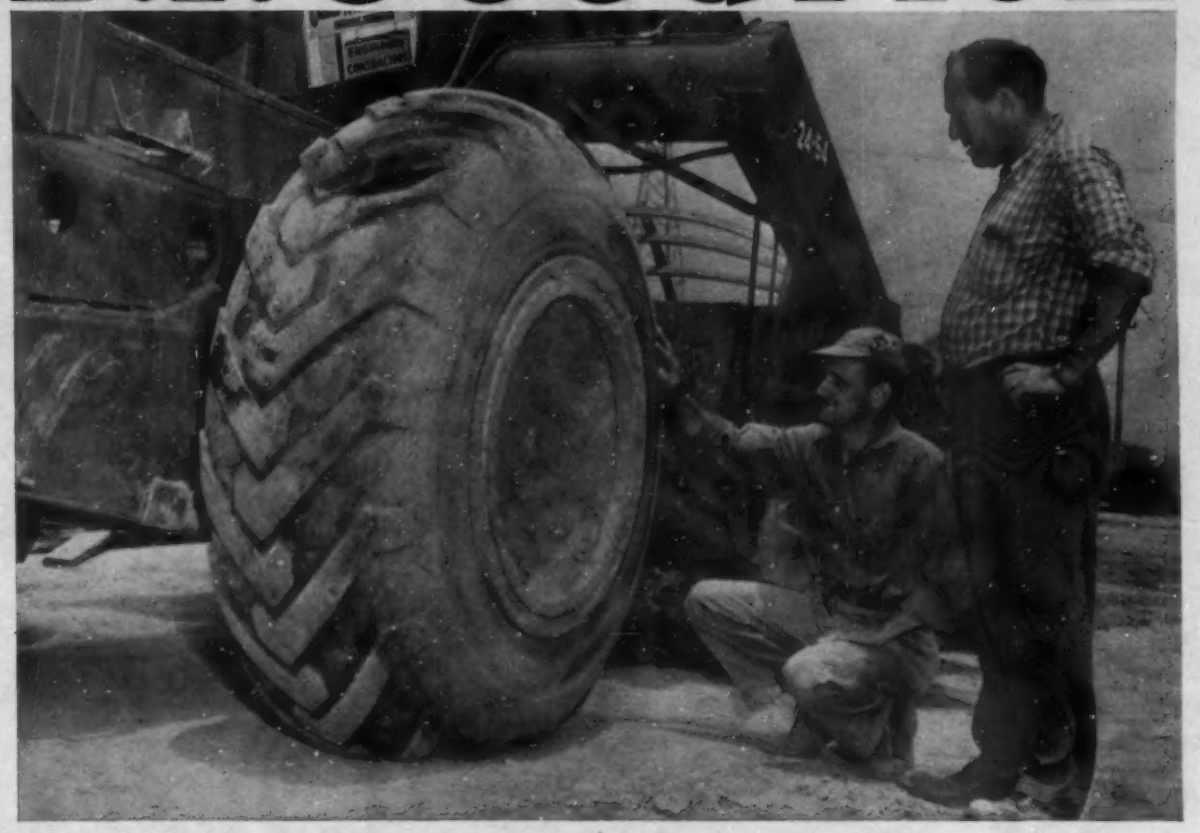
In construction of the Boston Southeast Expressway, this Bucyrus-Erie 3-yd. 71-B shovel loads trucks with granite, rock and dirt. Marinucci Bros. & Co., Inc., Boston, is the owner of this machine.

P. T. & L. Construction Co., Paramus, N.J., used this Bucyrus-Erie 2-yd. 51-B shovel to cut down high ground for fill to be used for the Garden State Parkway in New Jersey.

. . . for more details circle 247 on enclosed return postal card



B.F.Goodrich



These tires handle the biggest jobs... give more traction, more wear, more retreads!

MONTH in and month out, in all kinds of weather, Julius Porath and Son Company, Detroit, goes about the rugged job of building roads in southeastern Michigan. 105 vehicles—including trucks, cranes, dozers, graders—work 8 to 10 hours a day, 5 to 6 days a week.

Equipment rolls on soft ground, over rock-strewn roads, often over no roads at all. Unnecessary tire failures could tie up production—skyrocket costs. But not for Porath. They use B.F.Goodrich off-the-road tires, report they are "the best tires for this type of work."

One reason is the B.F.Goodrich FLEX-RITE NYLON cord body. It withstands double the impact of ordinary cord materials, resists heat blowouts and flex breaks. The FLEX-RITE NYLON body outwears even the extra-thick tread, can still be retreaded *again and again!*

B.F.Goodrich builds off-the-road tires with extra-thick treads designed to bite into the soil for maximum traction. No matter what kind of construction work you do, there's a B.F.Goodrich tire to make your work go faster, and save you money.

Your B.F.Goodrich dealer has a complete line of tires (left), and he offers expert, on-the-job tire service. See him today or write: *B.F.Goodrich Tire Company, A Division of The B.F.Goodrich Company, Akron 18, Ohio.*

THERE'S A B.F.GOODRICH TIRE FOR EVERY CONSTRUCTION JOB

UNIVERSAL | ROCK LOGGER | SUPER TRACTION | TRACTION EARTH MOVER | ROCK SERVICE

Specify B.F.Goodrich tires when ordering new equipment

B.F.Goodrich
FIRST IN RUBBER

Your B.F.Goodrich dealer is listed under Tires in the Yellow Pages of your phone book

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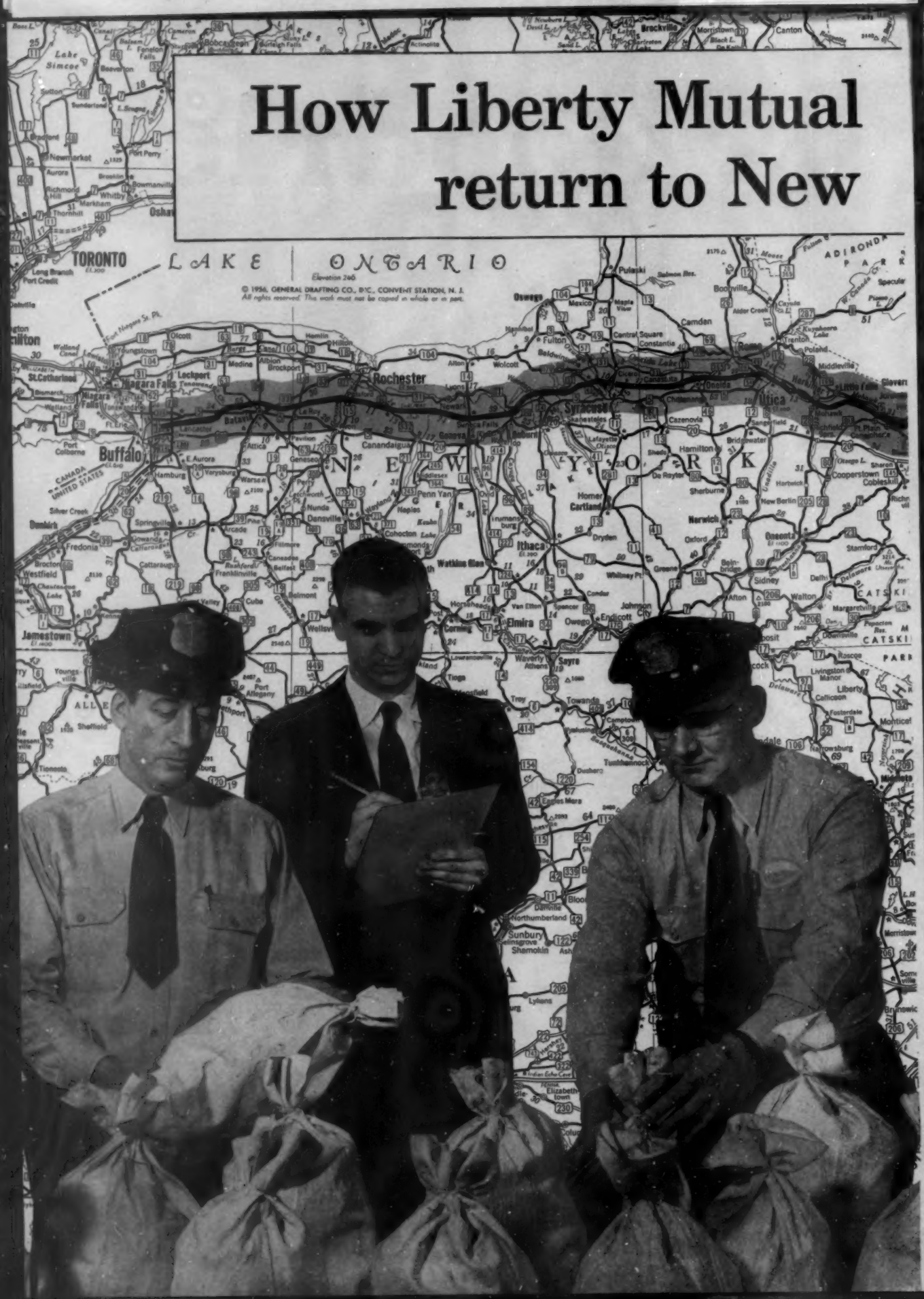
How Liberty Mutual
return to New
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LAKE ONTARIO
Elevation 246
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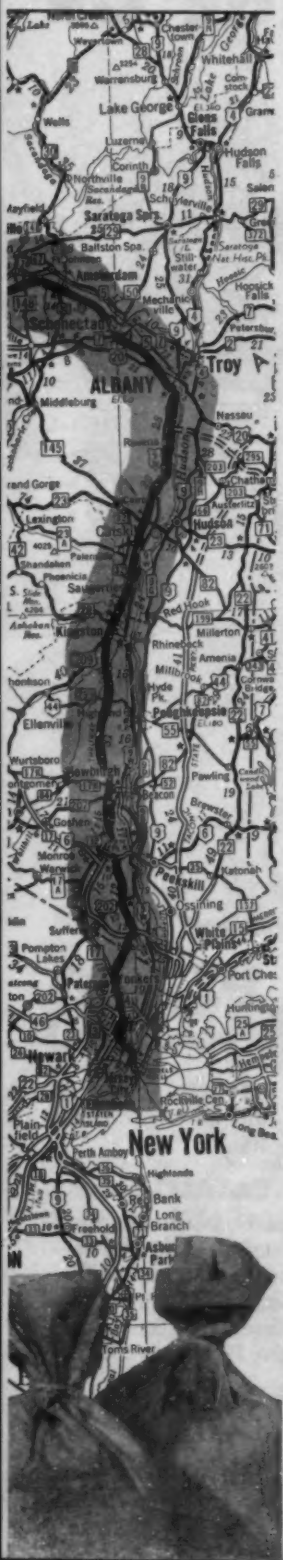
gave a $1,000,000 premium York Thruway contractors



When the world's biggest toll road sliced through New York — 64% of the mileage was insured by Liberty Mutual. Every contractor on that 200 mile stretch worked with Liberty to put safety first. The result: more than a million dollars in premiums returned to them.

Before work started, Liberty carefully analyzed potential hazards. As the job progressed, Liberty kept on top of problems through six offices between New York and Buffalo. Liberty engineers were always on hand — checking operations, studying traffic, making pre-blasting tests. When men got hurt, Liberty claimsmen were right at the scene, helping to provide the very best medical care.

Service like this — on every kind of construction job — has helped make Liberty Mutual America's largest carrier of Workmen's Compensation Insurance. Best's Reports give Liberty highest rating for financial strength. Liberty Mutual is *the company that stands by you.*

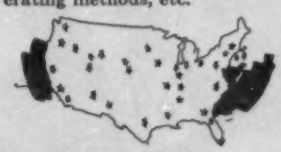
10 WAYS LIBERTY MUTUAL CUTS INSURANCE COSTS ON CONSTRUCTION JOBS

1. ADVANCE ANALYSIS, by Liberty engineers, spots and controls potential hazards before each of your projects begins.

2. ENGINEERS ON THE JOB who keep your men safe, control damages due to blasting, unsafe operating methods, etc.

3. RESEARCH by specialists in Liberty's own laboratory helps solve your difficult problems.

4. AROUND-THE-CLOCK CLAIMS SERVICE — full-time claimsmen on the bigger jobs — assures fast, fair claims handling.



5. ABILITY TO FOLLOW YOUR OPERATIONS — Liberty has branch offices in 146 cities — at your service.

6. SERVICE PERSONNEL live on large projects both here and abroad, plan and guide safety operation.

7. LARGE MEDICAL STAFF, plus three rehabilitation centers, assures the best treatment for injured men.

8. SPEEDY AUDITING service, tailored to your needs, assures proper allocation of payroll classification.

9. YOU DEAL DIRECT with company sales, loss prevention, claims and medical personnel. No middlemen.

10. INSURANCE AT LOW COST. Liberty's "expense ratio" on Compensation is lower than any other mutual company. Liberty has returned $363,275,898 in dividend savings to policyholders.

For 20 straight years — the nation's largest writer of Workmen's Compensation Insurance

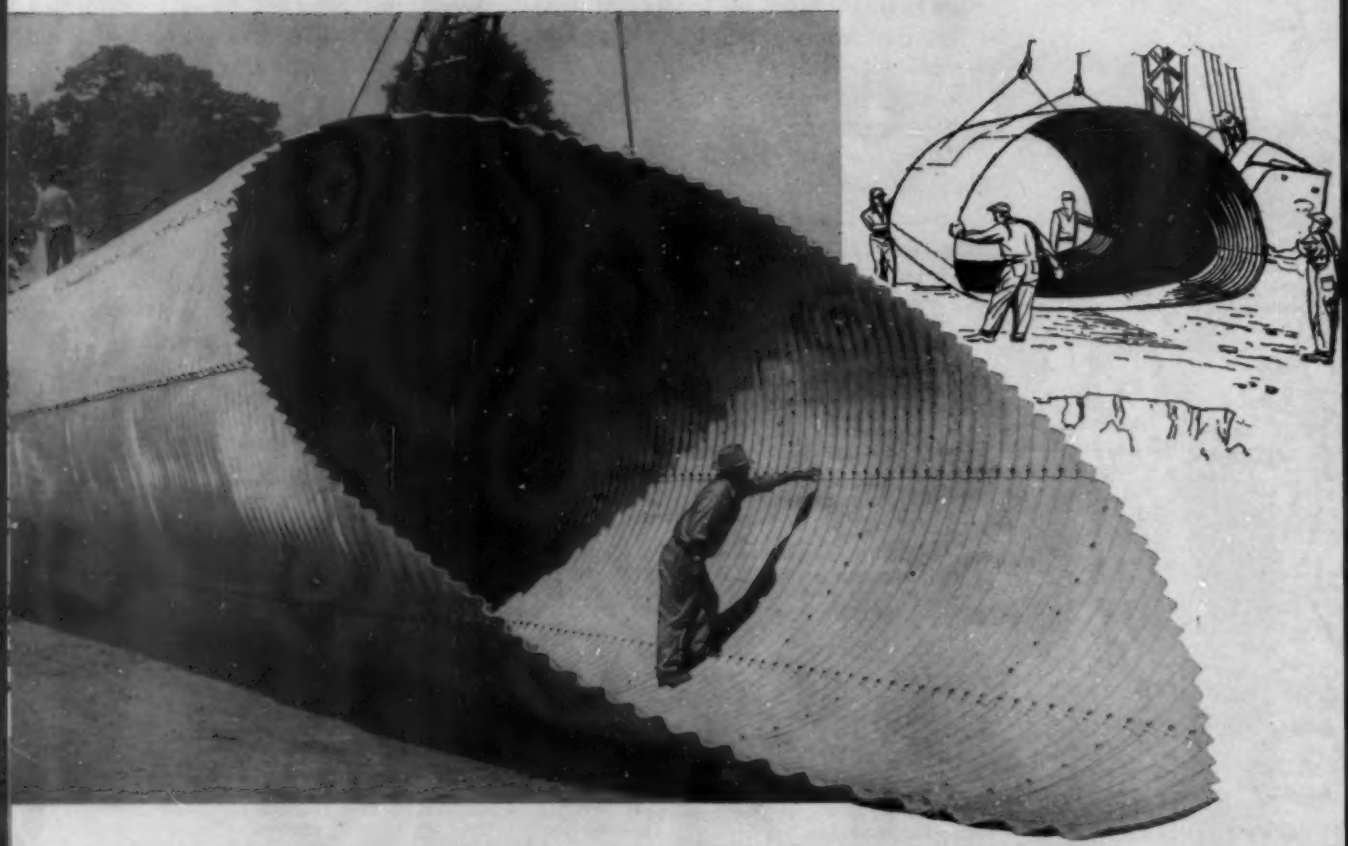
LIBERTY MUTUAL

The Company that stands by you

Liberty Mutual Insurance Company • Liberty Mutual Fire Insurance Company • Home Office: Boston

For Permanence, Economy, and

TWO USS PRODUCTS FOR LARGE OR



USS AMBRIDGE SECTIONAL PLATE

PIPE • PIPE-ARCH • ARCH

USS AMBRIDGE Sectional Plate Pipe, Pipe-Arches and Arches are available in a *complete range* of standard sizes to satisfy design requirements for any waterway opening. These flexible structures, with their 6" x 2" corrugations, can resist extremely large externally applied loads.

Special details such as asphalt coating, hook bolts, beveled ends, and skewed ends are furnished as specified for each job. These structures are economical, permanent, and go in quickly with minimum traffic interruption.

SEND FOR NEW CATALOG

Containing complete information on AMBRIDGE Sectional Plate, our new 28-page catalog covers such details as design, sizes, weights, gages, and assembly instructions. For your free copy, just send your request to American Bridge Division, U. S. Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

USS

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Speed of Installation

DRAINAGE STRUCTURES
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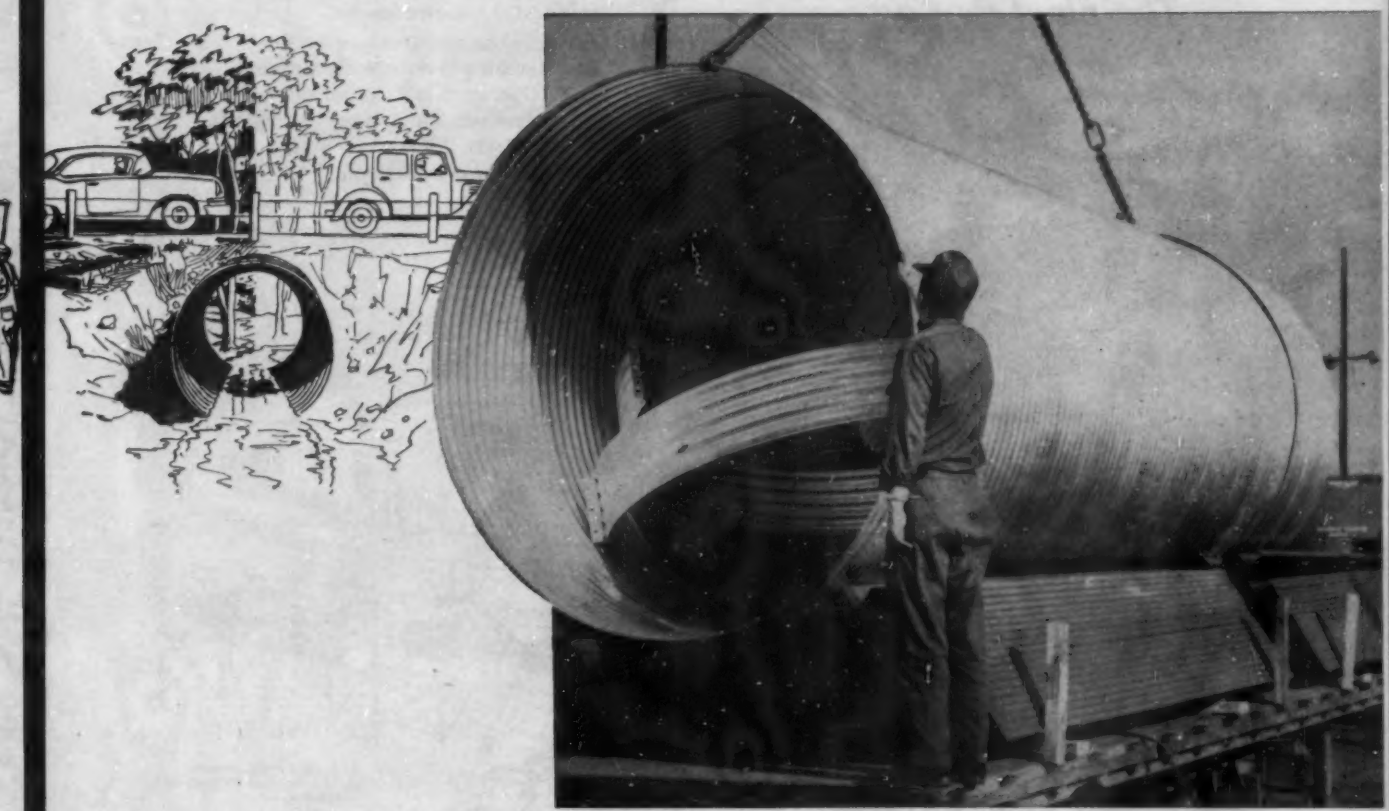

USS GALVANIZED CULVERT SHEETS

Culverts made from USS Galvanized Corrugated Culvert Sheets provide a lasting economical means of handling drainage problems. They will carry more load than rigid-type structures, and readily absorb the forces of impact and vibration.

These advantages, plus the fact that metal culverts are not subject to breakage, require no maintenance, cost less to install and are easy to ship and handle, make them ideal for most drainage purposes.

NEW CATALOG AVAILABLE SOON. We are completing a new catalog on USS Culvert Sheets for Metal Drainage Products. Covers design, sizes and weights, gages, installation and other engineering details. For free copy, send your request to United States Steel Corporation, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA. • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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USS

7-455

UNITED STATES STEEL

YOUR PROFITS GROW WITH THE TX4

The plant that grows with you. . .

Whether you operate 1, 2, 3, or 4 pavers — there's a BUTLER TX-4 Roadbuilders set-up for you. And as you grow — the same basic plant grows with you. No old equipment to replace . . . you simply add two bins and one batcher to expand a 1 or 2-paver plant to a set-up for 3 pavers. And for 4 pavers you add only one batcher to each of the four bins. Low investment and the highest batching speed the roadbuilding industry has ever known.

And all with only one operator — even the 4 paver set-up. Batching is completely automatic and interlocked. Operation is simultaneous or in sequence. A switch selects topping or base material as required. In short, the TX-4 *meets* every batching condition — every problem.

2 Compartments in each bin hold 2 sizes of stone, cement and sand. Two batchers for each material for
1 or 2 pavers
4 bins for 2 sizes of stone, cement and sand. Three batchers for each material for
3 pavers
4 bins for 2 sizes stone, cement and sand. Four batchers for each material for
4 pavers
By
BUTLER BIN
of course

The World's Most Portable Plant

The bin section of the TX4 is crane lifted and shipped in one piece. The batchers are in one unit with bracing all in place. No tie-downs or support needed for moving. All wiring and air piping are self-contained ready with quick-connectors for fast "plug-in" hook-up. Support columns ship separately and are hinged to bin, swing into place when crane lifts bin. Bolts are very few in number — all are large and easily handled. Bin rests on foam rubber cushion at top of batcher section, provides a tight, dust and cement proof seal when compressed by two hand-clamps which hold both sections securely. . . Dismantling and re-erection are but a matter of hours instead of days.

The Butler TX4 obsoletes all previous equipment ever built. Read the complete description offered in this new Bulletin. Every part, every component completely illustrated. Send for it today. Just write "TX4" and your address on a postcard.

BUTLER BIN COMPANY

959 BLACKSTONE AVE. ◆ WAUKESHA, WISCONSIN

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GYRO-FLO + CRAWL-IR

. . . a highway construction team that gives you completely mechanized drilling power at its RUGGED BEST!

THE new Ingersoll-Rand CRAWL-IR is the most completely mechanized, self-propelled crawler drill ever developed. Boom swing, boom lift, tower tilt, tower swing and tower lift are all hydraulically controlled at the touch of a throttle, permitting faster, easier and safer setups for drilling in any position. And because it tows its own air compressor, even up grades and over rough terrain, you don't have to take other equipment off the job for this purpose.

Teamed up with a Gyro-Flo 600-cfm, it gives you a drilling combination that has no equal for economy and dependability of operation. The famous Gyro-Flo rotary action, thoroughly proved by more than six years of on-the-job service, is your best assurance of low-cost, virtually maintenance-free air power. Ask your IR Distributor or representative for complete information on this pace-setting drilling team.

IR CONTRACTORS' COMBINATION

Ingersoll-Rand 14-612

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THE BEST AIR EQUIPMENT FOR BETTER HIGHWAYS

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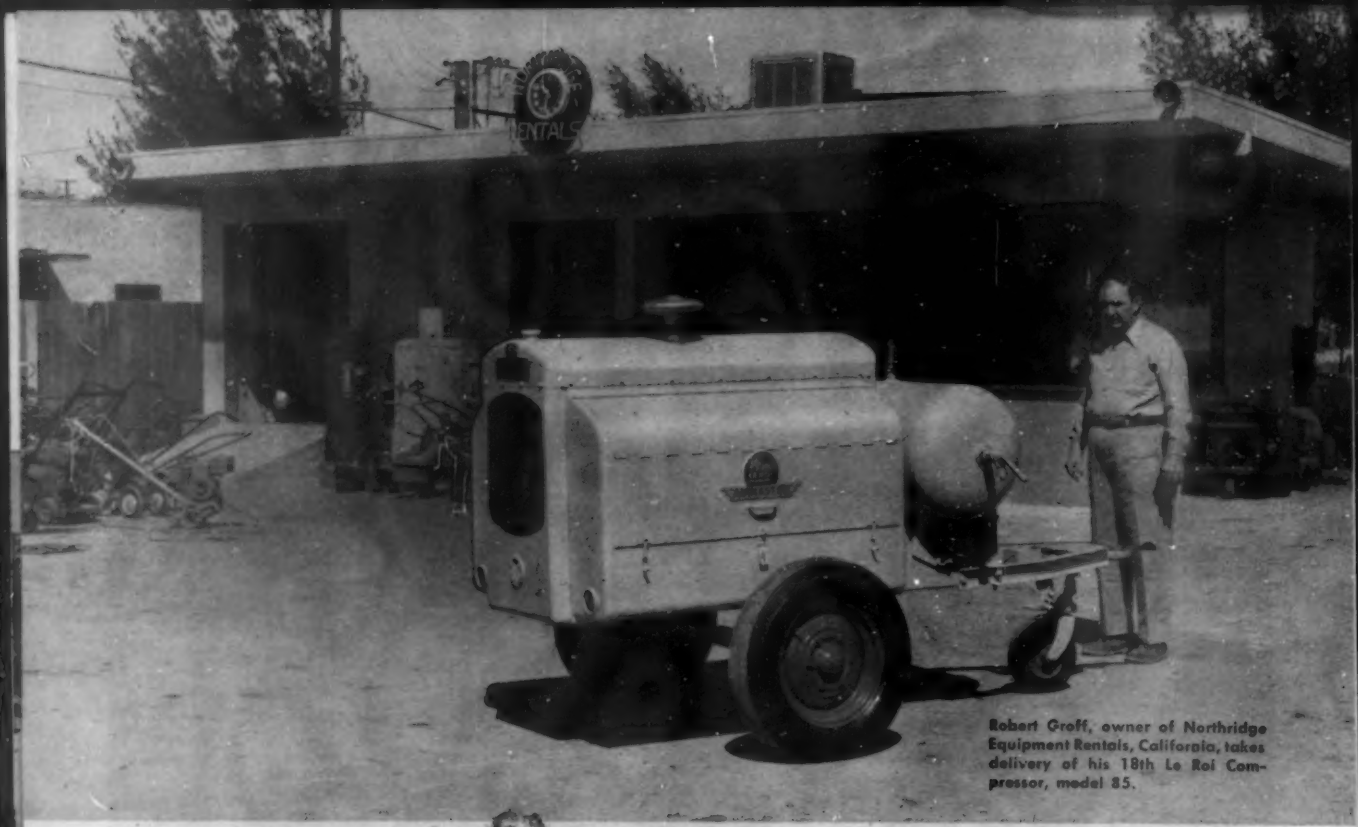

Robert Groff, owner of Northridge Equipment Rentals, California, takes delivery of his 18th Le Roi Compressor, model 85.

"Here's How I Make Money on Compressor Rentals"

LeRoi Compressors give top performance, require little maintenance, bring maximum profits from satisfied customers.

New units rented out minutes after delivery.

"If I have to make two service calls a month on a rental compressor, I lose the profit on that month's use," says Robert Groff, owner of Northridge Equipment Rentals, Northridge, California.

"That's why I always choose Le Roi and now own eighteen," says Groff. "They run day after day with little care, attention, or upkeep."

Dependability and performance are the cornerstones of Groff's successful business. His customers expect trouble-free equipment, economical in operation, and Groff sees that they get it! No company, he says, can hope to succeed in a rental business if they put their money into inferior equipment.

So much in demand are Le Roi Compressors that the eighteenth unit, shown above, was rented out minutes after delivery.

The Le Roi Air Compressor units rented out by Groff have a capacity of 85 cfm. They're ideal where portability is important . . . they trail well behind vehicles, and are balanced so that one man can easily position them on the job-site.

They're easy to operate, too. One control — the starter button — gives you 85 feet of air at 100 pounds pressure. That's more than ample for powering a heavy breaker. They are a perfect power source for Le Roi Newmatic Air Tools.

There's a big, lockable tool box on each unit — weathertight, and large enough to hold air tools, hose, and accessories.

Other Le Roi Compressors range in capacity from 105 to 600 cfm. All of them feature Le Roi's integral packages — proved air sources with power matched to the compressor by a manufacturer who knows both engines *and* air.

The qualities that make Le Roi air compressors money-makers in rental service are the same qualities that make them the favorite of owners, everywhere.

Whether you rent or buy, Le Roi's can be counted on for dependable, trouble-free operation.

PC-71

. . . for more details circle 294 on enclosed return postal card

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

This 240,000-pound steam drum, built by Combustion Engineering for a large generating plant, is here being hoisted 120 feet into position by strong wire rope. It's a striking example of how . . .

safety rides on quality wire rope

You may never hoist loads as large as this 120-ton drum. But *safe, top quality wire rope is just as important to your own operations.* For, although the price of a "bargain" rope would be less, failure of such a rope could cost you thousands of dollars in wrecked equipment. Don't be a victim of false economy. Buy a wire rope that's a quality rope—buy Wickwire Rope.

5339

WICKWIRE ROPE — A CF&I PRODUCT

CF&I

LOOK FOR THE **YELLOW TRIANGLE**

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso Farmington (N. M.) • Fort Worth • Houston • Kansas City • Lincoln (Neb.) • Odessa (Tex.) • Oklahoma City • Phoenix • Pueblo Salt Lake City • Tulsa • Wichita • **PACIFIC COAST DIVISION**—Los Angeles • Oakland • Portland • San Francisco • San Leandro Seattle • Spokane • **WICKWIRE SPENCER STEEL DIVISION**—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) New Orleans • New York • Philadelphia

. . . for more details circle 263 on enclosed return postal card

● It takes a concrete casting bed to make prestressed concrete beams. Pouring the massive bed structure for a casting yard near Chicago.

Record Pour for Prestressed Casting Yard

The largest known concrete pour on record in the Chicago area, 1902 cu. yd. in 8 hours, was made recently during construction of the prestressing plant of American Marietta's Lewistown Pipe Division located near LaGrange, Ill. The plant has a $2,900,000 contract with the Illinois State Toll Highway Commission to furnish more than 52,000 tons of prestressed concrete bridge girders for the Tri-State Route.

The record pour was made possible through the combined efforts of the Lewistown Pipe Division of M. A. Lombard & Son Co., contractor for the work; and Dolese & Shepard Co., supplier of the high-strength, ready-mixed concrete. The entire installation from excavation through cleanup required only 20 working days for completion.

The finished plant includes one prestressing bed 691 ft. long and a second bed 661 ft. long, containing a total of 200 tons of reinforcing steel and 4000 cu. yd. of concrete. Except for surface capping, each bed was cast continuously to form the monolithic self-contained structures required because of poor foundation soil conditions at the site. Above photograph depicts pour in progress at job site.

Designed for a maximum moment of 45 million inch-pounds, these beds are the longest known built to withstand such a tremendous prestressing force.

American-Marietta, through subsidiary companies, has contributed to the rapid acceptance of prestressed concrete in this country in the last few years, stemming from proof that concrete bridge members could be prestressed economically by the pretensioning method, the firm constructed the first bridge in the United States to utilize this development.

Highway Department Changes

Sweeping changes in the organization and top name list have been announced for the Michigan state highway department. The changes were put into effect recently by John C. Mackie, who took over July 1, as highway commissioner.

Many of the changes reflect the new commissioner's decision to "delegate more authority at all levels" and to establish "lines of responsibility consistent with good business or administrative practice."

Sidney H. Woolner is appointed chief deputy for administration, with Alfred H. Lawrence, director of the finance division. Howard E. Hill becomes deputy commissioner-engineering, having moved to this job from the Corps of Engineers at Detroit.

J. Carl McMonagle, director of the Michigan State University traffic center, will be "loaned" to the department on a part-time consulting basis to help develop a 5-year highway plan for the state.

Carlos A. Weber, present deputy commissioner, will head the combined road and bridge design sections, plus a traffic division, and also the contract-estimates section and the testing and research. Under Weber will be Cecil B. Laird in the newly created post of chief of highway construction, combining road and bridge work.

John D. Cruise, a career man in the department, becomes director of the planning division, now separated from the traffic division. E. D. Suino continues as maintenance engineer.

Fellowship for Graduate Study in Engineering Offered

A fellowship for graduate study in traffic or highway engineering at the University of Illinois, Urbana, has been established through the cooperation of the Automotive Safety Foundation. The fellowship carries a stipend of $1500 for the academic year and includes free tuition, equivalent to another $500. The award will be made for the period beginning in September, 1957.

Students interested should address the Graduate College, 109 Administration Building, Urbana, Ill., for entry forms. Further information may be obtained from the Department of Civil Engineering, 205 Civil Engineering Hall, Urbana, Ill.

● Eleven blocks of Calumet streets, constructed in 1906, still remain in use and rank as Michigan's oldest existing concrete pavements. Recent laboratory tests on the 50-year-old concrete showed specimens have a compressive strength of 5,480 psi.

Four DW15s move 350 yards of hard clay per hour on half-mile haul

H. H. Howard and one of the DW15 rigs, with D8 (Series E) pushing.

Working on State Highway 26, south of Daingerfield, Texas, J. E. & H. H. Howard have a 735,000-yard contract to raise the roadbed and widen part of it to four lanes.

When this picture was taken, all the earthmoving was being done by four CAT* DW15 Tractors with Scrapers, push-loaded by a D8. The spread averaged 3,500 cu. yd. of hard Texas clay per 10-hour day, hauling half a mile.

H. H. Howard says: "Our DW15s have worked steady for a year and a half with no trouble whatsoever except to replace an occasional cable. With the new D8 to push, we can load in a few seconds and keep all four scraper units on the run. Now we're buying a fifth DW15." This unit, incidentally, will make the twenty-fifth DW15 in the Howard fleet.

Now Caterpillar offers a *new* DW15 (Series E) with a new No. 428 LOWBOWL Scraper. The Cat high-torque Engine, specifically designed for the DW15, delivers 200 HP (maximum output capacity). With speeds up to 37.2 MPH, plus the extra sure-footedness of four-wheel traction, this rig gives you faster hauls and cycle times with greater safety. The No. 428 Scraper has a capacity of 13 cu. yd. struck—18 cu. yd. heaped—and it loads quicker and more easily because of LOWBOWL design.

Let your Caterpillar Dealer give you an on-the-job demonstration of this unit. Remember, he stands behind every machine he sells with prompt, reliable service and Caterpillar parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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WANTED— THE HARD WORK

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Snow Removal a Problem?

THINK OF...

FRINK

Specialists Since 1921 in

SNOW PLOW KNOW-HOW

V-TYPE SNO-PLOW
—rugged powerhouse for high-speed, heavy-duty highway work; leveling wings optional.

ROLL-OVER with Taper Blade
—for airports, expressways; rotates left or right in seconds; ends "deadheading."

ONE-WAY with Trip Blade
—for high-speed throwing and spreading, but windrows neatly at city speed.

REVERSIBLE Trip Blade
—all-purpose; plows left, right, bulldozes ahead; power reverse lever in cab.

Since the first steel plow (a Frink) hit the highway 36 years ago, every major advance in snow plow design and performance has been a product of Frink "know-how." Today there are four basic types of Frink Sno-Plows, each with models to fit trucks from 1½ to 12 tons, and most are interchangeable on the same attachment.

Whatever your area's snow removal problem, Frink makes THE plow best equipped to do the job faster, safer and at lower operational cost for plow and truck.

Learn all the facts and reasons why so many cities, towns, counties and states specify Frink Sno-Plows. See your distributor or write to Frink for descriptive folders about these plows.

For Snow Plow Know-How
It pays to think of

FRINK SNO-PLOWS

CLAYTON, 1000 Islands, N. Y.
Frink Snow Plows of Canada, Ltd., Toronto, Ontario

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ALL OPERATIONS ARE COMPLETELY INDEPENDENT—In addition to eliminating shifting time, *Independent-Travel* allows the operator to swing and hoist the load while travelling. Whether to save time or to jockey the boom around obstacles, the operator can swing the boom while his machine is travelling in either direction. This optional feature can be used with any front-end attachment.

Getting 9 hours' output in 8

Independent-Swing-and-Travel is available on 11 Link-Belt Speeder models. Eliminates shifting . . . saves 20-30 seconds each move

Link-Belt Speeder users are setting new high-production standards by equipping their machines with *Independent-Swing-and-Travel*. Why? It eliminates time losses ordinarily occurring when the operator shifts from swing to travel and from travel to swing. With *Independent-Travel* shifts are eliminated and the machine can swing and travel simultaneously . . . you can jockey the boom around obstacles in tight quarters, move away from bank cave-ins in split seconds!

If you'd like complete details, proof that *Independent-Travel* can up output . . . cut maintenance and spare parts costs, too — see your Link-Belt Speeder distributor or write Link-Belt Speeder Corporation, Cedar Rapids, Iowa.

MORE USABLE HORSEPOWER — Size for size, Link-Belt Speeder shovel-cranes utilize more of the engines' available horsepower. This bonus pays off in added power at the bucket teeth, greater line pull plus extra power to swing, hoist and travel. Although it gets more usable power and line pull out of the same engines used in other shovel-cranes, a Link-Belt Speeder remains well within the engine manufacturers' recommended operating speeds.

14.308-A

It's time to compare . . . with

LINK-BELT SPEEDER

Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls

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A single drop of used oil from this truck indicates true condition of the vehicle's oil . . . and tells a lot about the engine's operation.

Daily oil checks assure maximum lubrication efficiency in this diesel locomotive.

Now—they're testing used oil in minutes

THE NEED for a fast, accurate and practical method for determining the condition of used oil has long been one of the more serious problems confronting fleet operators. It's obviously wasteful to discard still-good oil, but operating a vehicle with contaminated oil could lead to costly engine damage. This was an unsolvable condition which maintenance men had come to accept.

Since no two vehicles, even of the same make and model, are identical in performance or operation, maintenance men were compelled to compromise on oil change "averages" recommended by engine manufacturers. This procedure is uncertain and costly. Fortunately, this operating conflict has been resolved with the introduction of a simple but completely reliable oil check system . . . the Shell ADC Oilprint Analysis.

The ADC Analysis was primarily conceived to determine proper oil change intervals for individual engines. However, it goes much further. It is capable of actually reducing engine maintenance costs by disclosing certain mechanical defects *before* they have caused serious engine damage.

The test procedure is very simple . . . requires little practice to perfect . . . and provides a reliable check of oil from merely two drops of used oil. In minutes, the degree of *A*lkalinity, *D*ispersancy and *C*ontamination can be determined easily.

Here are several typical examples from various areas of the country. They show how fleet operators, employing both diesel and gasoline engines, have successfully and profitably applied the ADC program.

A Kansas City Freight Line

Operating a large fleet of trucks, one Kansas City freight line previously had drained and replaced oil every 3,000 miles. After adopting the ADC Oilprint Analysis, individual test charts showed that, in most cases, drainage would not be necessary at less than 6,000-mile intervals. Even at this doubled interval, engine life was not affected. Further proof was established when these engines were inspected at 87,000 miles and no appreciable wear was found on bearings, pistons, rings or valves.

An Idaho Logging Operation

Oil had previously been drained after a limited number of hours of use on an Idaho company's diesel locomo-

Substantial oil economy is realized in this tractor, because oil is changed only when indicated by the Oilprint.

Taking a quick "fingerprint" of crankcase oil from an interstate carrier.

tives. With the ADC Oilprint Analysis as a guide, the oil-change interval has now been safely increased many-fold. The savings made possible by this on-the-spot test in oil, filter change and labor costs were considerable. Furthermore, leaky head gaskets are frequently discovered before any serious engine trouble develops. Here is another valuable plus for the ADC Oilprint Analysis.

A Washington, D.C., Transit Company

This transit company operates a large fleet of buses with both gasoline and diesel engines in use. With the difference in operating schedules . . . rush hours, short and long hauls, around-the-clock schedules . . . both engine types were believed to require complete oil changes every 2,000 miles. When the ADC program was instituted, the tests showed that oil-drain periods and minor maintenance checks could be safely extended to every 3,000 miles for gasoline engines and 4,000 miles for diesel engines.

Fleet operators, who are concerned with extending the service of crankcase oil and avoiding the risk of using contaminated oil, are invited to sit in while a Shell service engineer demonstrates the time-and-money advantages of an ADC Oilprint Analysis program.

Photo shows an oil-spot test card . . . one phase in the visual life record of a change of oil.

One drop of a special indicator* fluid developed by Shell checks the alkaline reserve in the oil.

*Indicator Fluid U.S. Patent No. 2,770,530

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

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Personals

Appoint New Commission Body for North Carolina Highways

W. H. Rogers, Jr., veteran state highway engineer of North Carolina, continues in office, having been reappointed by the new highway director, William F. Babcock. Rogers has held this post since 1949.

Mr. Babcock is the state's first incumbent of the newly created post of director of highways. He is a transportation engineer with a background of college teaching and consulting engineering work. Appointed by Governor Luther H. Hodges, Babcock will work under a newly appointed seven-man policy-making state highway commission headed by W. T. Joiner of Raleigh, an attorney.

William F. Babcock

JOHN H. MULLEN, veteran, highway leader in Minnesota, has become executive director of Minnesota Good Roads, Inc., a state-wide citizens' organization. Mr. Mullen was a pioneer highway commissioner in his state and for 27 years was president of Nelson, Mullen & Nelson, Inc., contractors.

FRANK E. ANDREWS, Pacific Northwest regional engineer for the Bureau of Public Roads, has retired after 38 years with the Bureau. He was in charge of location and construction of the western 850 miles of the Alcan Highway during World War II.

Andrews typifies the veterans in highway work who have seen the revolution from horse and mule days. His first job following World War I service was as resident engineer in 1919 on the Mt. Hood Loop Highway in Oregon. Other later assignments covered pioneering projects in various western states.

Frank E. Andrews

World War II brought Andrews increased responsibilities; his Alcan Highway post placed him in charge of 600 engineers and assistants on the Yukon-Alaskan end of the famed wartime road job. His postwar return to the Bureau's Portland office culminated in 1953 by his succession to the division's top regional post on retirement of W. H. Lynch.

Dr. Adelbert Diefendorf is to be the dean of a newly organized

"Our equipment keeps on rolling—

We use Colmonoy No. 2, the Best Hard-Facing!"

You get top abrasion resistance and easy welding with low-cost Colmonoy No. 2 hard-facing electrodes. Use them on tractor treads, dipper teeth, ditcher teeth, truck beds, dragline buckets, any steel or manganese steel part.

Excellent arc stability and good flowing qualities make these low hydrogen AC-DC electrodes a cinch to apply. A Colmonoy No. 2 deposit has a Rockwell C hardness of 50 to 60.

Write today for more information about Colmonoy No. 2 and the rest of the Colmonoy family of hard-facing alloys.

HARD-FACING ALLOYS

WALL COLMONOY

DETROIT 3, MICHIGAN

BIRMINGHAM • BUFFALO • CHICAGO • HOUSTON • LOS ANGELES
LINDEN, N. J. • MOORESVILLE, PA. • PITTSBURGH • MONTREAL • GREAT BRITAIN

Available in 1/8, 5/32, 3/16, and 1/4-inch diameters, packed in 10-lb. sealed metal containers.

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Meetings

AMERICAN PUBLIC WORKS CONGRESS—Annual Convention, Benjamin Franklin Hotel, Philadelphia, Pa.; September 22-23.

AMERICAN SOCIETY OF CIVIL ENGINEERS—Annual Convention and Civil Engineering Show, Hotel Statler, New York, N.Y.; October 14-18.

NATIONAL SAFETY COUNCIL—Annual Safety Congress and Exposition, Conrad Hilton and other hotels, Chicago, Ill.; October 21-25.

NATIONAL HIGHWAY CONFERENCE FOR COUNTY ENGINEERS AND OFFICIALS, French Lick Hotel, French Lick, Ind. (sponsored by American Road Builders Association); October 28-30.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS—Annual Meeting, Conrad Hilton Hotel, Chicago, Ill.; November 18-22.

HIGHWAY RESEARCH BOARD—Annual Meeting, Sheraton-Park Hotel, Washington, D.C.; January 6-10, 1958.

AMERICAN ROAD BUILDERS' ASSOCIATION—Annual Convention, Sheraton-Park Hotel, Washington, D.C.; January 20-23, 1958.

ASSOCIATED EQUIPMENT DISTRIBUTORS—39th Annual Meeting, Conrad Hilton Hotel, Chicago, Ill.; January 26-30, 1958.

NATIONAL BITUMINOUS CONCRETE ASSOCIATION—Annual Meeting, Hotels Sands, Sahara and Flamingo, Las Vegas, Nevada; February 4-6, 1958.

school of engineering at the College of the Pacific, Stockton, Calif. Dr. Felix A. Wallace, chairman of the Engineering department as it formerly existed here, has been on leave and is returning as professor of Engineering and department head.

Dr. Diefendorf was formerly head of the department of Civil Engineering, University of Utah, and has been active in the educational division of ARBA.

A. J. RAYNER, who was for a time executive secretary of the New York State Bituminous Concrete Producers Association, died recently in Albany. He was prior to that the first secretary of the Virginia Road Builders' Association.

WHY LUFKIN CHROME CLAD TAPES last longer

Tempered steel tape.

Markings bonded direct to steel protected by higher surface of multiple electroplatings.

Multiple coats of electroplating.

Rust resistant coating.

Hard, smooth, non-glare chrome finish further protected by plastic coating.

EASY TO READ MARKINGS THAT ARE DURABLE

Chrome Clad tape lines, a Lufkin exclusive, won't crack, chip or peel and are rust and corrosion resistant. Their jet black markings are easy to read and won't wear off. For longer wear try the Chrome Clad Leader — an example of a superior Lufkin tape with an "All-Metal" line. Has rust-resistant steel case covered with handsome vinyl. Replaceable lines. 25, 50, 75 and 100 ft. lengths.

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PRECISION TOOLS
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BETTER MEASURE WITH LUFKIN

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FOR FAST, ECONOMICAL
HIGHWAY TEST CORES
The New Acker KR Shot Core Drill!

The new Acker KR SHOT CORE DRILL is especially designed for obtaining clean, unbroken highway test cores quickly, inexpensively — accurately.

For economy, inexpensive steel shot does the cutting, reducing bit servicing and operational expenses.

Improved Acker design assures clean-cut core recovery up to 20" in diameter even from steel reinforced concrete.

Get the facts today—ask for Bulletin 19 R & S.

The Acker KR mounts on truck, trailer or drag. Power can be gasoline, kerosene, diesel, electric or air motor.

ACKER DRILL CO., INC.
SCRANTON 3, PA.

Manufacturers of diamond and shot core drills and supplies.

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Is economical but exact.

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Fast, one-step reflectorization as easy as painting! Hazards reflectorized with 3M's "Codit" Liquid flash brilliant warning at night for safety. Treatment costs a low 17¢ per square foot. Buy supply from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minnesota.

Get "Codit" Reflective Liquid in 6 oz. aerosol spray or 4 lb. can or complete safety kit.

3M

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Safety Tips for Use on Heavy Job Construction Equipment

Improper use of crawler, truck and locomotive cranes can result in permanent disability or death to workers and loss of money to management from damaged equipment or loads and costly delays.

The National Safety Council, in a recent data sheet entitled *Crawler, Truck and Similar Cranes* reports that an analysis of crane accidents shows that the most dangerous area is near a load, with 41 percent of all injuries happening there.

Data Sheet D-448, prepared and reviewed by safety engineers, all experts in the field, gives this breakdown of crane injuries occurring elsewhere:

Unsafe practices by operators and operating too near obstructions and stationary equipment—12 per cent.

Violations of safe practices in fueling, checking water, and other maintenance work—11 per cent.

Other factors contributing to crane accidents are failure of defective booms, cables and sheaves, working or standing in the line of swing of a crane cab or boom and jumping off or climbing on cranes without using handholds.

One of the chief crane operating hazards is electricity. If booms or hoist lines contact power lines, death-dealing shock may result. Before operating a crane near power lines, consult a power company for safety recommendations. An electronic safety device that warns of the nearness of power lines is available commercially.

The analysis, according to the data sheet, one of many prepared periodically by safety experts, indicates a need for observance of three basic steps:

1. Require regular and thorough inspections of hooks, slings, cables, booms and other vital parts and keep them in safe condition.

2. Train operators, hitchers, riggers and other workers in safe practices.

3. Require them to observe safe practices.

In addition, the data sheet gives more specific information on signals, boom stops and slings.

Blasting Caps vs. Children

For more than 30 years the explosives industry has waged an unrelenting nationwide campaign warning children against the perils of playing with blasting caps.

With the cooperation of youth groups, law enforcement officers, teachers and government agencies, it tells children what blasting caps are and how dangerous they can be in untrained hands.

Obviously, when youngsters have been warned to leave blasting caps alone, the other end of the chain of circumstances that leads to such accidents deserves attention—that is, how do caps get into children's hands. In this phase of the work, the Institute of Makers of Explosives, which coordinates the program, has had the whole-hearted backing of the explosives users. Actually, the cooperation of the men who handle and use caps is just as important as the repeated warnings to children.

In its continuing campaign against these accidents, the Institute is currently distributing a new poster to all users of blasting caps. It should be particularly impressive to anyone who works where blasting caps and dynamite are used. The proper handling of blasting caps involves many things, and paramount among all considerations is that they be kept safely removed.

No Bicycles on Expressways

A law proposed in the Wisconsin legislature would give state and local officials the authority to forbid bicycles and low powered cycles on expressways.

Another legislature bill in Wisconsin would require local authorities to confer with the state highway commission before establishing one-way traffic or turning rules on streets meeting state routes.

ONLY EIMCO...OFFERS YOU THIS LOADER SELECTION

EIMCO 105 EXCAVATOR

EIMCO 105 FRONT-END LOADER

Here are Eimco's two heavy-duty 105 loaders. By visual comparison, you can see the extreme difference in loader construction. For you, this difference means a wide choice in adapting profitable techniques for your future earth-moving jobs. With either you get no-clutch, no-shock shifting.. forward operating visibility.. independent track reversal.. extra stability.. rugged construction.. operating ease.

THE 1½ YARD EIMCO EXCAVATING LOADER can dig and load rock and other tough materials on a comparable basis with boom-type equipment many times more costly. The bucket travels overhead to discharge, providing an operating cycle of 10 to 12 seconds. With 39,000 lb. digging force and "high leverage" rocker arm contour, it digs **fast**.. even in tough clay, hardpan, shale, glacial till, etc.

The Eimco 105 Excavator is especially adapted to all types of tunnel excavating.. loading blasted rock or overburden on narrow benches.. removing material on highway projects without blocking the motorist by-pass lane.. and many other applications where ability to load without turning is convenient and saves time. Spot trucks close behind and your Eimco 105 operator will keep haulage equipment working at a maximum pace every hour.

Write for Bulletin L-1048 today!

THE 2½ YARD EIMCO FRONT-END LOADER with 40,000 lb. break-out is an extremely flexible heavy-duty loader — ideal for digging off high banks.. handling fine, dusty or wet material.. dicharging into any size trucks spotted on a higher elevation.. cutting smooth grades where strong downward pressure is needed.. razing.. bulk loading.. and many other applications. Dozer blades, fork lifts and other attachments are readily fitted to this loader. It operates in 9' 6" headroom.. can reach over a 14' bin, hopper or gondola to discharge its cargo.

The loader mechanism operates at high mechanical efficiency and has many exclusive hydraulic system protective features. Combine this with extreme 105 tractor mobility and you get an earthmover that will make more trips every hour.. stay on the job longer.. get greater total production than competitive front-end units.

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B-282

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Highway Estimating Methods

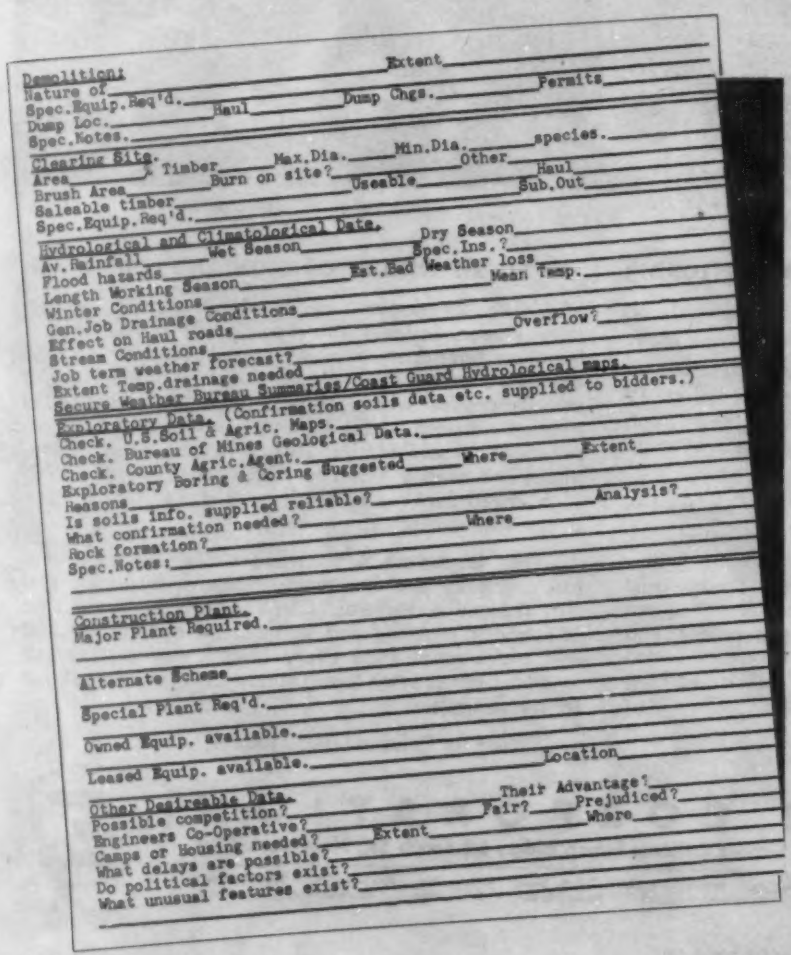
By Geo. E. Deatherage, P. E.
Construction Consultant

Mr. Deatherage, author of this series on highway cost-keeping, has developed an 8-volume "Manual of Advanced Construction Management" for readers who are interested in more details of cost-keeping and the many related subjects in highway contracting business management. Please address your inquiry to George E. Deatherage and Son, P. O. Box 921, Lake Worth, Fla. Many contractors are finding this manual useful in a training course for superintendents and project managers. It is written primarily for these supervisory employees as an aid in better equipping them for taking on larger responsibilities and improving their management techniques.

Bidders Site Investigation

ONE OF the cardinal outstanding sins of the estimating profession is to prepare an estimate without examining the site. No detailed information supplied the estimator in the shape of maps, specifications or "bidders information" is the least substitute for personally "walking around the property" in order to get the "feel" of the project.

The estimator must of necessity form a "mental picture" of the job, not only as it will be when completed, but as it exists before bidding. Any professional construction man will readily recognize and appreciate this fact; one which is difficult to put in words so as to be fully appreciated by the novice.


Demolition:
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Clearing Site.
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Max.Dia.
Min.Dia.
species.
Brush Area
Burn on site?
Other
Saleable timber
Useable
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Spec.Equip.Req'd.
Hydrological and Climatological Data.
Av.Rainfall
Wet Season
Dry Season
Flood hazards
Spec.Ins.?
Length Working Season
Est.Bad Weather loss
Winter Conditions
Mean Temp.
Gen.Job Drainage Conditions
Effect on Haul roads
Overflow?
Stream Conditions
Job term weather forecast?
Extent Temp.drainage needed
Secure Weather Bureau Summaries/Coast Guard Hydrological maps.
Exploratory Data. (Confirmation soils data etc. supplied to bidders.)
Check. U.S.Soil & Agric. Maps.
Check. Bureau of Mines Geological Data.
Check. County Agric.Agent.
Exploratory Boring & Coring Suggested
Where
Extent
Reasons
Is soils info. supplied reliable?
Analysis?
What confirmation needed?
Where
Rock formation?
Spec.Notes:
Construction Plant.
Major Plant Required.
Alternate Scheme
Special Plant Req'd.
Owned Equip. available.
Leased Equip. available.
Location
Other Desireable Data.
Possible competition?
Their Advantage?
Engineers Co-Operative?
Fair?
Prejudiced?
Camps or Housing needed?
Extent
Where
What delays are possible?
Do political factors exist?
What unusual features exist?

Practical estimating requires a definite knowledge of existing work conditions, based on reliable field investigations. This is particularly true when the specifications or general conditions state that the Owner, while supplying bidders information, does not guarantee its accuracy but presents the data simply as the best information available; and considering also that the Contractor shall take the necessary precaution to determine the actual state of affairs for himself. In other words, when he accepts the bidders information supplied him, at his own risk.

The obvious necessity for complete field investigations before bidding is so clear that it is always a source of wonderment that so many contractors neglect it — many to their sorrow. Irrespective of the thoroughness of a field investigation, even a divinely inspired estimator finds it impossible to anticipate all work conditions. He is obliged to safeguard his figures with allowances for incidentals and contingencies which he cannot foresee. The outcome of any construction project is nebulous enough without endangering the operation from a lack of complete data as to work and site conditions.

Pre-bidding investigations in a sense divide themselves into two main categories: that of site investigation and its "physical conditions"; and what may be termed "work conditions" which have to do with labor and public relations. Under the latter category may fall such things as licenses, occupational

(Continued on page 106)

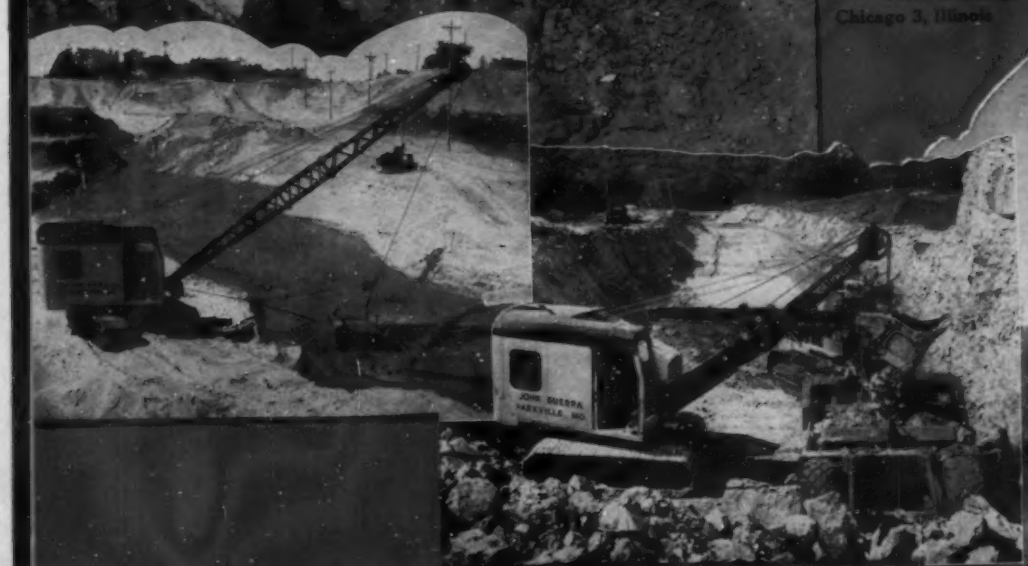
THE WORKHORSE of the 3/4 yd. FIELD!

Here's a machine you can put into ¾ yd. work and know you are going to get full ¾ yd. output from it. The Northwest Model 25 is built for the workhorse jobs. Machinery Bases are rugged, heat treated alloy steel castings. Machinery side frames are cast integral with the rotating base casting. Realize what this means. It assures a lifetime permanence of shaft alignment. It eliminates weaving that is the direct cause of wear. *There is nothing else like it!*

You can go through the whole machine — Booms!—Smaller for workhorse digging and lifting. Uniform Pressure Swing Clutches!—cooler running, trouble-free. The Helical Gear Drive!—running in oil, mounted on anti-friction bearings free from the adjustments and stretching that come with chain drives. The "Feather-Touch" Clutch Control!—with the *feel of the load* free from the complications of delicate mechanisms, valves, pumps and tubing. The Cushion Clutch, a wide range of Boom Hoist Equipment to choose from, Easy Convertibility —These and many more advantages give you a piece of equipment with ability that you can't find anywhere else for handling the workhorse jobs and making money.

This is the ¾ yd. machine you should investigate. A Northwest Man will fill in the details.

NORTHWEST ENGINEERING CO.
1504 Field Building, 135 South LaSalle Street
Chicago 3, Illinois



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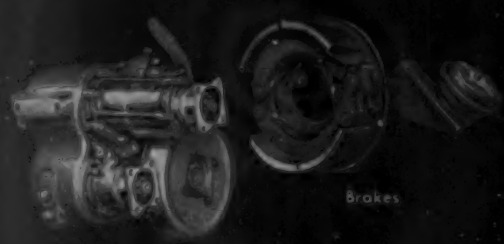
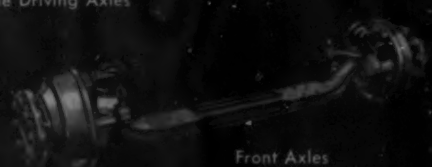


Brakes

Gear Boxes

Single Driving Axles



Front Axles

Whether your requirements call for highway or off-the-road equipment—Timken-Detroit offers torture-tested axles and brakes proven by almost 50 years of field testing and laboratory research!

Timken-Detroit meets all your requirements for driving, trailer and front axles . . . brakes and gear boxes . . . with a complete range of capacities in each product category. Shown here are some of the units included in the complete line.

Nearly 50 years of manufacturing experience—plus continuing field and laboratory research—have taught Timken-Detroit the exacting needs of the trucking industry. Timken-Detroit Axles and Brakes are designed and built to give you the utmost in service, safety and dependability.

To you—this leadership in power transmission and braking systems means more productive road time, reduced operating costs and lower maintenance expense. Timken-Detroit Axles and Brakes are engineered to carry more payload . . . and stop more payload . . . at lower operating costs under all conditions.

The Timken-Detroit line of Medium and Heavy Duty Double-Reduction Tandems is an example of the superior engineering features and quality built into every Timken-Detroit product.

Plants at: Detroit, Michigan • Oshkosh, Wisconsin • Utica, New York
Ashtabula, Kenton and Newark, Ohio • New Castle, Pennsylvania

TIMKEN Detroit AXLES
TIMKEN-DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN
The Accepted Standard

Axles and Brakes for Commercial Vehicles

Products of

Rockwell Spring and Axle Co.

Timken-Detroit Heavy-Duty Double-Reduction Tandems Give You Payload Leadership!

Ability to take the toughest going and still deliver the load on time has helped make these rugged tandems the number one choice with operators of heavy-duty vehicles. These tandems give you the big advantages of long trouble-free service, economical performance and utmost dependability.

Here are a few of the features developed in famous Timken-Detroit Tandem Drive Units—

"Cradle Ride" Suspension... free ends of long, resilient springs float in axle spring guide brackets. This permits axles to articulate freely, adjusting themselves to road irregularities. Floating springs cradle the vehicle, materially reducing road shock and eliminating source of vehicle flutter. "Cradle Ride" suspension stabilizes the load, permits easy, restful driving . . . improves driver control and safety. Driving and braking forces are transmitted only through torque rods.

Hypoid Gears with their larger pinions and greater tooth contact give you outstanding performance, top efficiency and long life—plus lower maintenance costs.

Inter-Axle Differential divides torque evenly between axles . . . yet permits wheels of one axle to turn faster or slower than wheels of the other axle. This means both axles are always doing equal amounts of work. Driving parts and tires last longer. Controlled from the cab, differential can be locked out at any speed to give positive through drive.

Rectangular Shaped Axle Housings are forged from high carbon steel. This rectangular shape, combined with full strength corner sections, provides the greatest strength possible with minimum weight and size.

Famous Torsion Flow Axle Shafts are made even stronger through the use of more splines and greater root and body diameter.

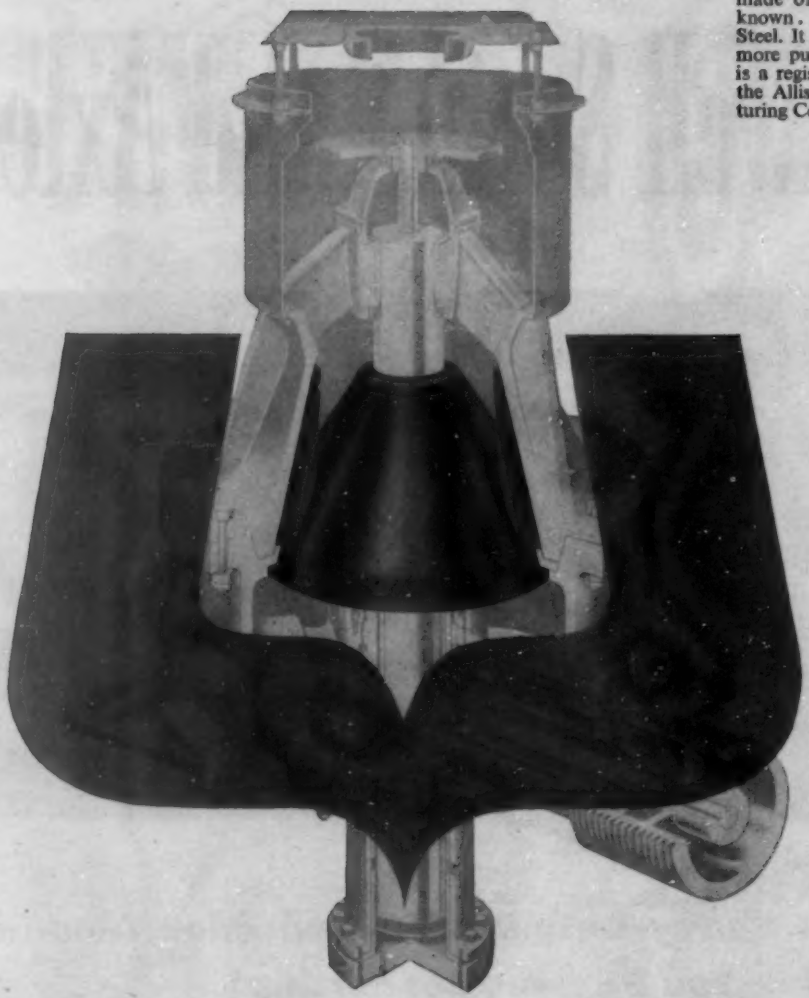
Dependable Heavy Duty "P" Series Air Brakes with unit-mounted design make a compact self-contained assembly. Temperatures are lower and liner life is longer because of open type spiders. Tapered "Econo-liners" provide greatest thickness in area of greatest wear.

Unequaled parts interchangeability gives you more time on the road—reduces parts inventory—speeds service. Parts are standard items readily available.

. . . for more details circle 327 on enclosed return postal card

©1957, RS&A Company

WORLD'S LARGEST MANUFACTURER OF AXLES FOR TRUCKS, BUSSES AND TRAILERS



Concave ring and mantle of this *Hydrocone* crusher are made of the toughest steel known . . . Amsco Manganese Steel. It *gives* a little, to take more punishment. *Hydrocone* is a registered trade-mark of the Allis-Chalmers Manufacturing Company.

How a little give adds a lot of life to AMSCO CRUSHER PARTS

Both mantle and concave ring crush a lot more feed because of certain properties of Amsco® Manganese Steel. The metal *gives* a little under crushing forces, absorbs stresses, resists cracking and chipping. Yet these same forces work-harden the surface of Amsco Manganese Steel to as much as 500 Brinell . . . a high hardness, stubborn to wear.

Amsco Manganese Steel Crusher Parts maintain their ductile undersurface and work-hardened surface even when worn thin. That's why Amsco parts endure severe abuse for so many work hours without letup.

To be sure of getting Amsco Manganese Steel, order replacement parts from your crusher manufacturer. Amsco makes manganese steel parts for most manufacturers of crushing, grinding and pulverizing equipment.

Amsco also produces other alloy steels with maximum wear resistance under particular service conditions

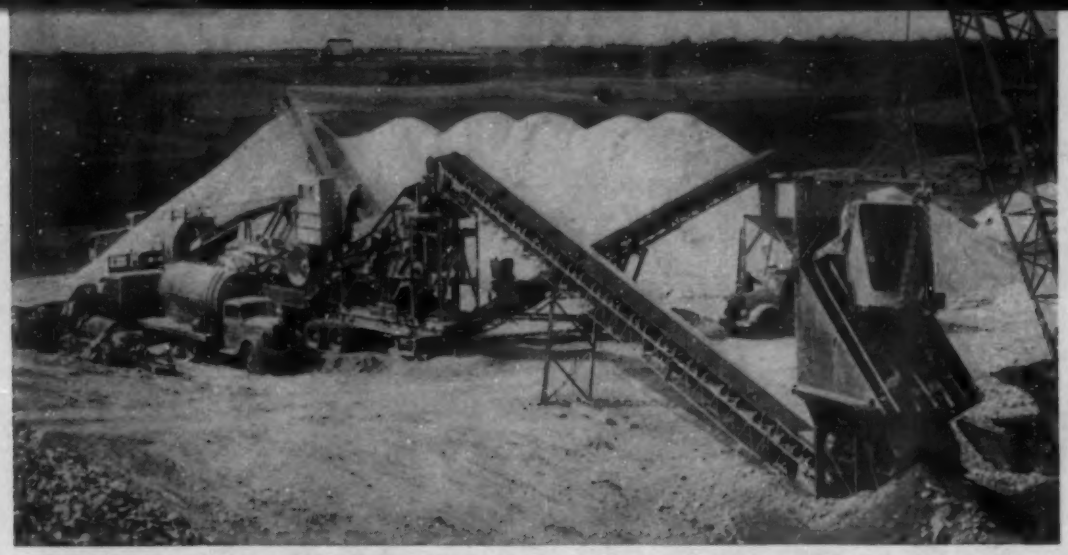
AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS; JOLIETTE, QUEBEC

. . . for more details circle 239 on enclosed return postal card



● Portable crushing plant used by Wauconda Construction Company for subbase material for 10 miles of the Illinois Toll Road. (This plant was pictured in the June issue of Time magazine.)

Portable Crusher Handles Big Tonnage

The specifications for crushed subbase aggregate for the Illinois Toll Road are tough and the tonnages large. The requirements haven't daunted officials of Wauconda Sand and Gravel Co., of Wauconda, Ill. This firm is supplying the contractors on a 10-mile northern segment of the $250 million project, its production of 150,000 tons being handled by the only portable unit in the program.

The subbase material is specified to be a frost-resistant, free draining material, with strict limitation on the 200 minus fines (3% or less). The big problem has been to produce the material in high volume and at satisfactory cost out of bouldery gravel, despite the large amount of waste fines produced.

The firm according to co-owner Martin Immenga began work with a Universal 293QS plant, said to be the largest of its kind and capable of taking material up to 20 in. size. This plant according to the owners produced enough volume to justify working pits even with an average of 30% reject sand and dust.

The unit is equipped with a screening system to reject excessive fines. This feature is considered specially important on a job such as this one where economical rejection of undersized and substandard material is necessary in profitable fulfillment of contract specifications. The 293QS plant eliminated the need for a portable screening unit and produced more than 2000 cu. yd. per 10-hour day.

The severity of the load on this crushing plant, handling bouldery glacial gravel, is explained by noting that one or the other of the three crushing units crushes at least 75% of the particles—compared to the requirement of only about 25% crushed, common on typical "easy-going" specifications for base gravel.

Sand, clay and pit dust are scalped off with a Simplicity 4' x 10' 2-deck screen with ¼" openings.

The strictness of the toll road specifications limiting fines to 3% as compared to 7% to 10% permitted on state road work is mentioned by Immenga as indicative of the requirements that will prevail in the Interstate highway program. The problem with glacial gravel in the area usually will be to get a larger proportion of free-draining material while running at top speed in a pit filled with sizes up to 16 in. or so.

The 293QS plant (pictured) is the one shown in Time magazine's story of June 24, 1957. More recently the contractor has used, at the jobsite, a Universal 880 Senior "R" Gravelmaster with a 1036 jaw crusher and a 4 x 12—2½-deck screen. And, on order in late summer was a No. 849 portable washing plant, 4 x 16 three-deck screen and PMCO slurry pump.

$448,000 Lost in Toll Road

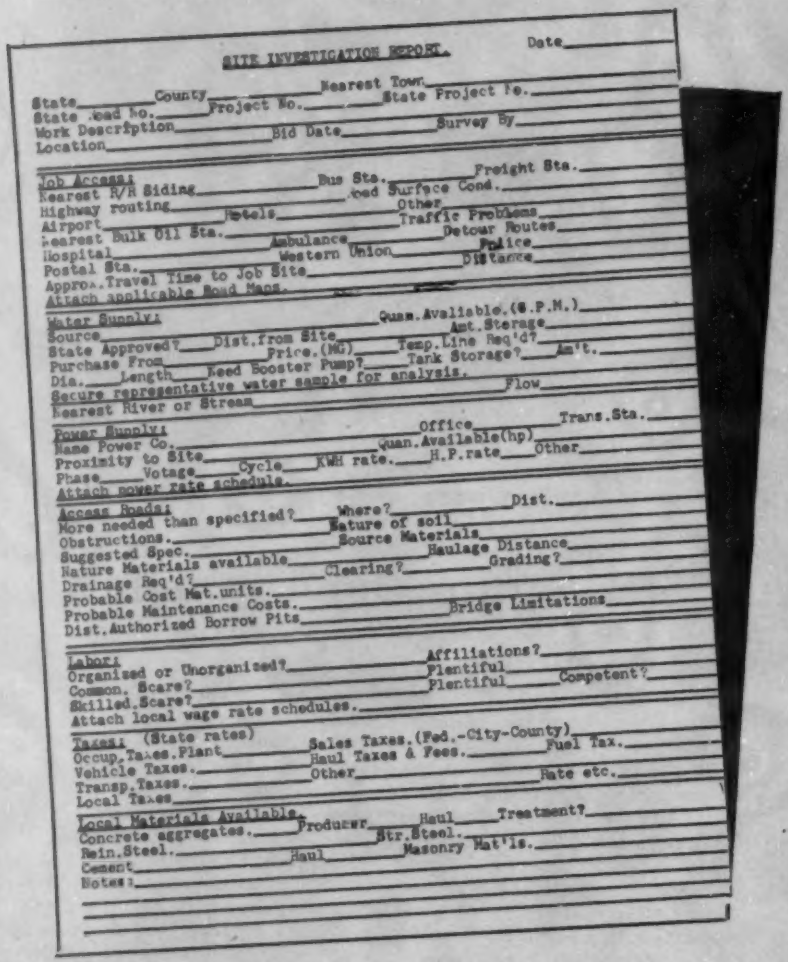
The problems of awarding agencies in getting the best possible bids these days can be illustrated by an experience reported in the Chicago Tribune. The Illinois Toll Road Commission on May 1, on recommendation of the engineers, rejected five bids for construction of a 5.4 mile segment of toll road. The low bid of $11,334,000 was submitted jointly by Contracting and Materials Company, Kenny Construction Company, and Louis Garavaglia.

Believing that this bid included an excessive amount of subgrade and subbase materials, the Commission decided to readvertise. The commission purchased $485,000 worth of crushed stone and other materials for furnishing directly to this job and readvertised it on this basis.

The same bidders emerged victorious in the second round with their bid of $11,297,000, only $37,000 less than the original bid, leaving the Commission holding the sack on its material purchase. In the second round the bid item for placing the state-furnished materials was only a little under the original price for both supplying and placing these materials.

New Engineering Firm

E. S. Preston has resigned as location engineer for the Ohio department of highways to set up a unique engineering firm. He will produce plans, quantities and estimates by a combination of aerial photography and electronic computer work. This is believed to be the first private service to utilize both devices.



SITE INVESTIGATION REPORT. Date

State County Nearest Town
State Road No. Project No. State Project No.
Work Description Bid Date Survey By
Location

Job Access:
Nearest R/R Siding Bus Sta. Freight Sta.
Highway routing Road Surface Cond.
Airport Hotels Other
Nearest Bulk Oil Sta. Traffic Problems
Hospital Ambulance Detour Routes
Postal Sta. Western Union Police
Approx. Travel Time to Job Site Distance
Attach applicable Road Maps.

Water Supply:
Source Quan. Available.(G.P.M.)
State Approved? Dist. from Site Amt. Storage
Purchase From Price.(MG) Temp. Line Req'd?
Dia. Length Need Booster Pump? Tank Storage? Am't.
Secure representative water sample for analysis.
Nearest River or Stream Flow

Power Supply:
Name Power Co. Office Trans. Sta.
Proximity to Site Quan. Available(hp)
Phase Votage Cycle KWH rate. H.P. rate Other
Attach power rate schedule.

Access Roads:
More needed than specified? Where? Dist.
Obstructions. Nature of soil
Suggested Spec. Source Materials
Nature Materials available Haulage Distance
Drainage Req'd? Clearing? Grading?
Probable Cost Mat. units.
Probable Maintenance Costs. Bridge Limitations
Dist. Authorized Borrow Pits

Labor:
Organized or Unorganized? Affiliations?
Common, Scare? Plentiful
Skilled, Scare? Plentiful Competent?
Attach local wage rate schedules.

Taxes: (State rates)
Occup. Taxes. Plant Sales Taxes.(Fed.-City-County) Fuel Tax.
Vehicle Taxes. Haul Taxes & Fees. Rate etc.
Transp. Taxes. Other
Local Taxes

Local Materials Available:
Concrete aggregates. Produces Haul Treatment?
Rein. Steel. Str. Steel.
Cement Haul Masonry Mat'ls.
Notes?

HIGHWAY ESTIMATING

(Continued from page 100)

taxes, local ordinances as to sanitation, permits, etc. etc.

In the second article in a previous series by this author, under date of April, 1956, captioned "General Overhead," a "Check or Reminder List" of some 209 possible overhead items was presented. Although this over-all check list is invaluable in preventing omissions of necessary items, it does not in itself serve as a substitute for a "Field Investigations Report" as a result of a site survey, inasmuch as it presents no data as to locations of available services, distances from the job, extent of the facilities if any, and other factors.

Field Investigations

Systematic procedure in the making of field investigations establishes the time-saving necessity of having advance knowledge of what one desires to investigate, at least as far as the major items are concerned. And it also shows the need for setting the factors down in systematic report form, so that the answers can be written in as the information is developed. Such a report should be made part of the estimating data, to serve as a latter historical record of the conditions under which the work was done. It is this information which adds to the value of costs secured on past similar projects as a check on future bidding.

A site investigation result will give a more complete "picture" of conditions if made in the formal report form, as opposed to a series of notes hastily set down with no consideration of system or order. For this and other obvious reasons previously outlined, a typical "Site Investigation Report" is presented; to be followed later in this series with a "Work Conditions Report" having to do more with labor and public relations.

How One Consultant Participates in Highway Work

An example of how consulting engineering organizations have, in some cases, already become multiple-job operators on highway work is illustrated by the current assignments of J. Stephen Watkins, Consulting Engineers, of Louisville and Lexington, Kentucky.

Work now under contract with this firm includes the following clients:

Kentucky State Highway Department

Survey, design and plans for approximately 11 miles of primary road, Frankfort to Versailles.

Survey, design and construction plans for approximately 8 miles of primary road southeast from Lexington.

Survey, design and construction for approximately 11 miles of Interstate Highway north of Richmond. (US-25)

Tennessee State Highway Department

Survey, design and construction plans for approximately 30 miles of Interstate Highway from Jellico to Vasper. (US-25)

Indiana State Highway Department

Design and construction plans for 7.5 miles of Interstate Highway near Shelbyville. (US-421)

Michigan State Highway Department

Survey, design and construction plans for approximately 18 miles of Interstate Highway near Battle Creek. (US-12)

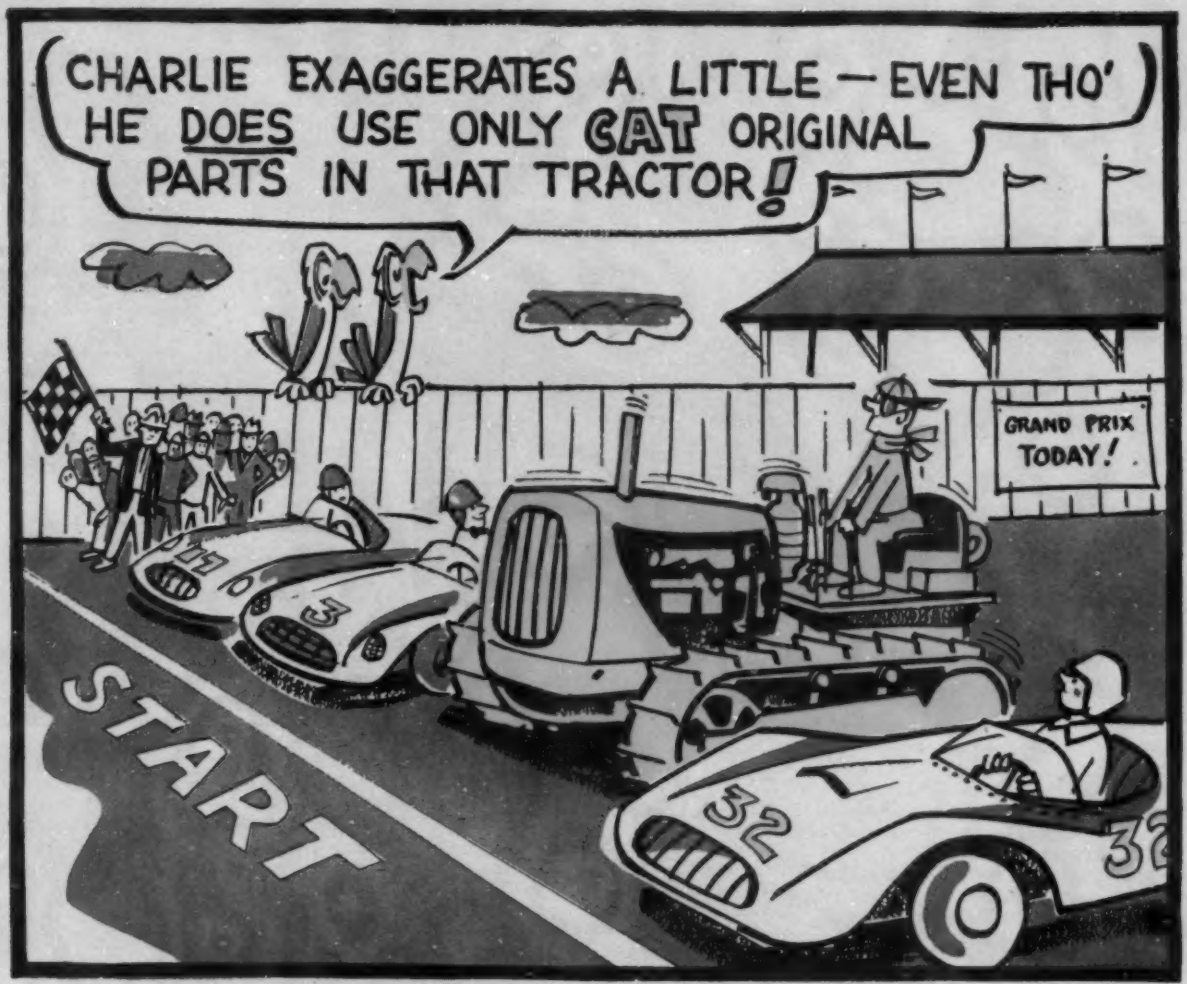
Survey, design and construction plans for approximately 7.7 miles of primary road near Battle Creek. (M-78, Interstate and State.)

Ohio State Highway Department

Survey, design and construction plans for improvement, and widening of approximately 3 miles of primary road in Hamilton County. (SR-125)

The firm contemplates undertaking further work on both state and interstate programs as the programs develop.

● A broker's license is required in Pennsylvania for all persons, corporations or association retained by the Department of Highways to appraise real estate needed for right-of-way purposes. This policy was outlined in a recent opinion by the attorney general of the state.



Are they really as much alike as they look? Steel used in industrial standard bolts must withstand 120,000 pounds pull per square inch—CAT* bolts must withstand *at least* 151,000 PSI. Same with other Cat original track parts—higher standards. With "look-alike" track parts, who knows? Be sure to get parts you can trust—from your Caterpillar Dealer. He always has *exactly* the part you need. Call on him anytime.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

New Products

Reader Service Numbers Are on Enclosed Postage-Paid Postal Card

Allis-Chalmers Scraper

Easy Maneuvering, Visibility, Speed Featured in New Scraper

A new hydraulic 7 cu. yd. struck, 9.5-cu. yd. heaped, 12-ton payload motor scraper has been added to the line of Allis-Chalmers Manufacturing Co., Milwaukee, Wisc. This is the Model TS-160 rated at 155 hp.

This new scraper is stated to match power with big scraper strength and to feature easy maneuvering, visibility, speed and economy for a wide range of construction and maintenance jobs.

The TS-160 has an Allis-Chalmers 6 cylinder, 516-cu. in. displacement, supercharged diesel engine rated 155 hp at 2200 rpm. A one-piece all-steel tractor frame gives rigid support for engine, clutch and transmission and provides easy accessibility to these components for service without disturbing adjacent parts. Final drive housing is an all-steel, precision-welded structure that is stress-relieved and line-bored for true alignment of all gears, shafts and bearings.

For more details cricle 101 on Enclosed Return Postal Card.

All-purpose 4 Wheel Tractor Has 4 Speed Transmission

A new model 840 4-wheel tractor and a 4-speed transmission option for the model 820 tractor have been announced by Ford Motor Co.'s Tractor and Implement Div., Birmingham, Mich.

The new model 840 resembles the 850 tractor but has the 4-speed transmission as standard equipment. This allows both the 840 and 820 to be equipped with a recently adopted over-and-under transmission as a factory-installed option. These 800 series tractors, with the over-and-under transmission installed, are all-purpose tractors with 12-forward and 3-reverse speeds.

For more details circle 102 on Enclosed Return Postal Card.

New Traffic Stripers Mark and Retrace Lines on Curves

The SL-46 "Skipliner" device, announced by Wald Industries, Inc., Huntington, Pa., is said to accomplish the problem of retracing existing intermittent traffic lines and adjusting marking machine cycles in transit.

Specifically the unit was designed for truck towed stripers of all makes, but engineers report that it can be adapted for the larger type self-propelled stripers.

Basic mechanism is an epicyclic gear train with a mechanical interlocking device precision built and assembled in a sealed unit. By means of the conveniently designed controls it is possible for the operator to stop the cycle, return the cycle to a zero or starting position, advance or retard the cycle indefinitely for exact registration over old lines. It is also possible to change from a skip to a solid line on curves, and return to the skip sequence after the curve has passed, by the movement of the same control lever that stops and resets the unit to starting position.

For more details circle 103 on Enclosed Return Postal Card.

Killer for Hard-to-Kill Weeds Gives Full Season Control

A new weed killer, said to be the first to eradicate hard-to-kill Johnson, Bermuda and other weed grasses with a single application, has been announced by General Chemical, Div., Allied Chemical & Dye Corporation, 42 Rector St., New York 6, N. Y.

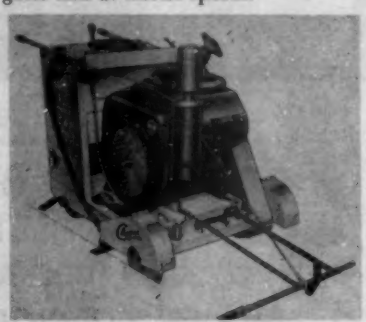
Developed by General Chemical's research department, the product is known as Hexachloracetone and is being marketed in a number of formulations under the trade name HCA Weed Killers for use in non-crop areas. HCA is designed for use with ordinary weed oils and is stated to not only materially increase their performance and efficiency but to exhibit excellent properties of its own. It prevents resprouting of noxious grasses by killing the roots, gives full season control when applied at almost any time of the year, and kills weeds without sterilizing the soil. In addition, HCA in oil gives immediate results by "killing back" top growth in from 12 to 48 hrs. after spraying.

For more details circle 104 on Enclosed Return Postal Card.

36 HP Concrete Saw Has New Type Self-Propelling Mechanism

An all new 36 hp concrete saw model C-362, designed for high production sawing on highways, turnpikes and airfield installations, has been announced by Clipper Manufacturing Co., Suite 232, 2800 Warwick, Kansas City 8, Mo.

The model C-362 features dual balance construction, one-piece frame design for precision weight distribution and easy maneuverability. One man lifts up, lines up, then saws. Constant, adequate weight over the blade during cutting is stated to prevent riding out of the cut even on the hardest aggregates and at fastest speeds.



Clipper C-362 Concrete Saw

The C-362 uses a completely new type of self-propelling mechanism, Drytrac oilless transmission, that gives positive and accurate rear wheel drive. The drive shaft carrying the abrasive coated wheels is mounted on sealed, anti-friction bearings, for less power loss and longer life.

For more details circle 105 on Enclosed Return Postal Card.

Increased Capacity Rating for Most Timken Bearing Series

Capacity rating of most series of Timken roller bearings have been increased,

(Continued on page 112)

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CHICAGO 10, ILLINOIS

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About New Equipment and Literature:

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366	367	368	369	370	371	372	373	374	375		359	360	361	362	363	364	365

Name_____ Title_____

Firm or Gov't. Dept._____

Street_____

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Name_____ Title_____

Firm or Gov't. Dept._____

Street_____

City_____ State_____ 9-57

NOT GOOD AFTER OCTOBER 15, 1957

WHY send a man to do a boy's work?

As you travel around the country, you see a lot of big graders pushing just a "hat-full" of dirt . . . rolling a blade-load that any team of horses and a split log could handle. This light work needs doing, and the big graders do a good job. But an efficient 60 or 80 hp grader could perform these same tasks just as well . . . at much lower cost.

Sure, standardizing your fleet on powerful Adams* 660's (or other 150 to 190 hp graders), simplifies your operation. It gives you grader power for any work, using machine nearest the job-site. But, when modern graders travel at speeds of 18 to 27 mph, is that "nearest grader" idea so important?

Handle light grading at lower cost per job

You may find it profitable to look at lighter weight "blades" . . . the 80 hp Adams 330, for around $14,000 FOB . . . or the 60 hp Adams 220 for just over $10,000 factory list. By using either of these machines on your lighter work, you can greatly reduce your investment and ownership costs. And you'll save on maintenance and operating expense, too.

Releases your big graders for more profitable work

When you relieve your heavy-duty graders of the work in shallow cuts and light materials, they too, can earn you a better profit. You concentrate your big grader power where you can put its extra "muscle" to full use . . . spreading big-volume dirt, scarifying, making heavy cuts, turning or casting high windrows, ripping down heavy side-banks, cutting deep ditches, etc. This way, your big machines move more yardage . . . show a larger profit for every hour's work.

Sized-to-job graders raise fleet output

With your big machines assigned to heavy work, and lighter machines to lesser tasks, every grader works nearer to full rated power . . . produces nearer its maximum output. You handle all jobs at *lowest possible* cost . . . end-up with a bigger net profit on every contract.

Size your graders to the jobs they have to do. For light work choose a 60 or 80 hp Adams . . . for general duty, an Adams of 115 or 123 hp . . . for heaviest construction, a 150 or 190 hp Adams 660. Call or write for complete details, and let us arrange a demonstration.

*Trademark G-1559-DC-1

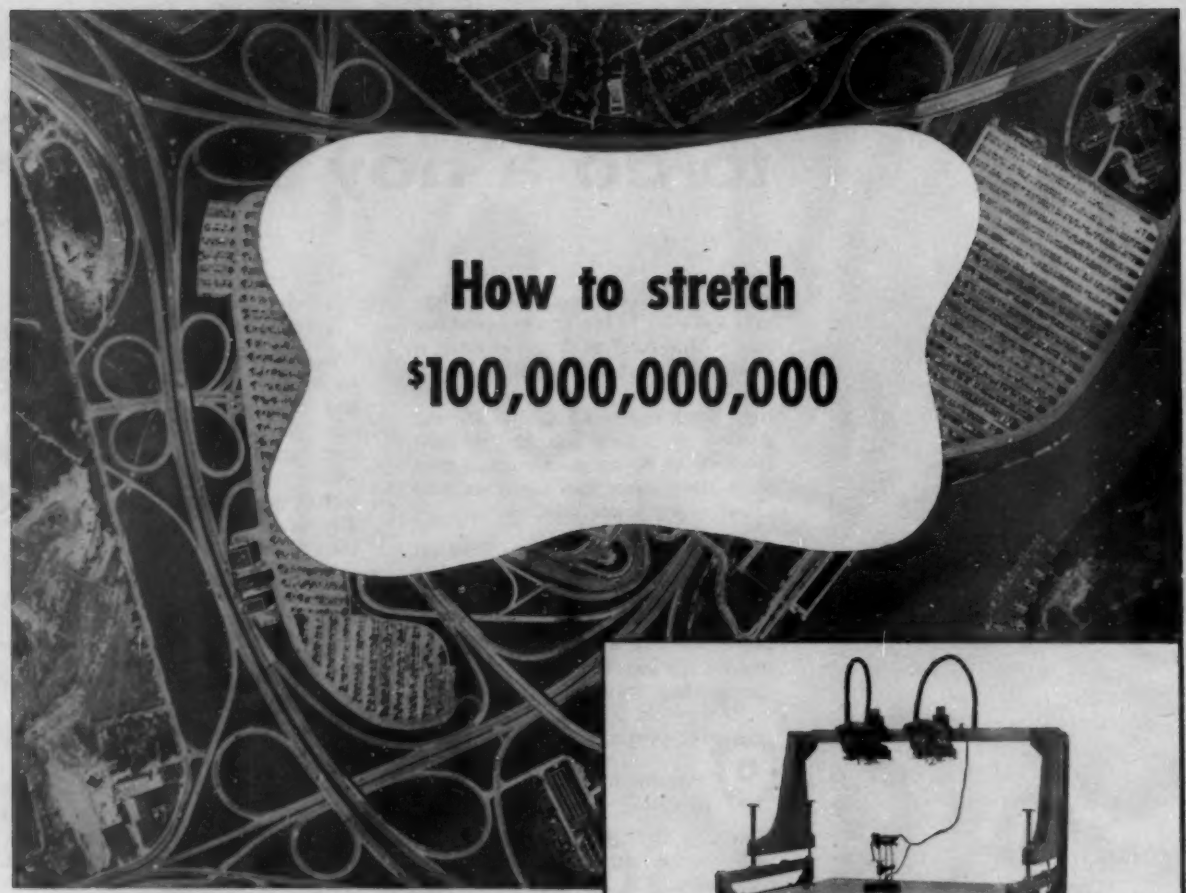
This kind of light blade-work need not "tie-up" your heavy-duty graders. 15,500-lb., 60 hp Adams 220 grader has plenty of power to smooth a finish grade, while your more powerful machines keep busy on heavier work — where the pay-off is bigger.

. . . for more details circle 295 on enclosed return postal card

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit



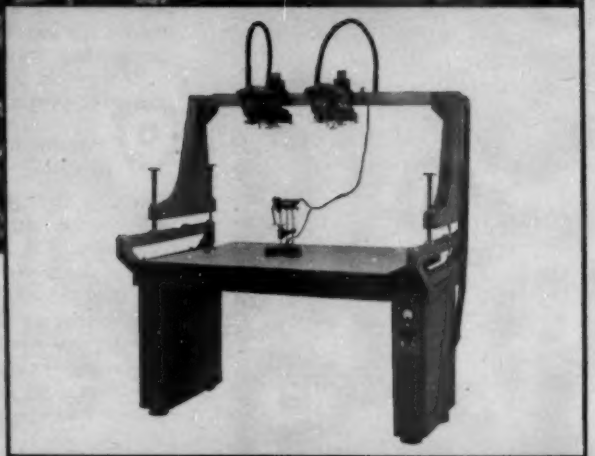
How to stretch $100,000,000,000

Photo by Air Survey Corporation, Arlington, Va.

That's the estimated cost of highway expansion planned for the next decade. B&L Balplex Plotters will stretch this budget over more and better roads by cutting costs from aerial photographs to final engineering maps.

Balplex saves time! Maps larger areas from fewer photographs taken at greater heights. Standard Multiplex operation, no training problems.

Balplex saves money! Complete capital equipment for precision mapping at scales as large as 1"/50', for only $4250. (Reduction printer & centering device optional.)



Bausch & Lomb BALPLEX PLOTTER

MAIL COUPON TODAY FOR FULL DATA

BAUSCH & LOMB OPTICAL CO.
86321 ST. PAUL ST., ROCHESTER 2, N. Y.

☐ Send me B&L Balplex Catalog F-303

☐ Send me data on the complete B&L photogrammetric line

NAME.....

TITLE.....

BUSINESS ADDRESS.....

CITY..... ZONE..... STATE.....

. . . for more details circle 244 on enclosed return postal card

Ideal for work in close quarters on housing project

The city of Calgary, Alberta, is building a system of city lanes (alleys) in an area of new homes on the west side of the city. To handle the necessary earthmoving, the city rented two D Tournapulls — one from A. Baldwin, the other from Jefferies and Sons Ltd. Tournapulls worked under the supervision of the City Engineering Department.

Build "T" shaped lanes

On the day photographs were taken, each Tournapull was building a "T" shaped lane (alley). Tournapulls self-loaded up to 5 pay-yards of gravel and sandy silt — working either across top of "T", or up stem. When excavating up stem, "D" starts cut toward lane intersection . . . continues to load right up to, during, and after making 90° turn . . . completes right-angle cut on lane across top of "T". Continuous loading reduces cycle time . . . moves more yards per hour . . . completes job sooner.

Low land brought up to housing grades

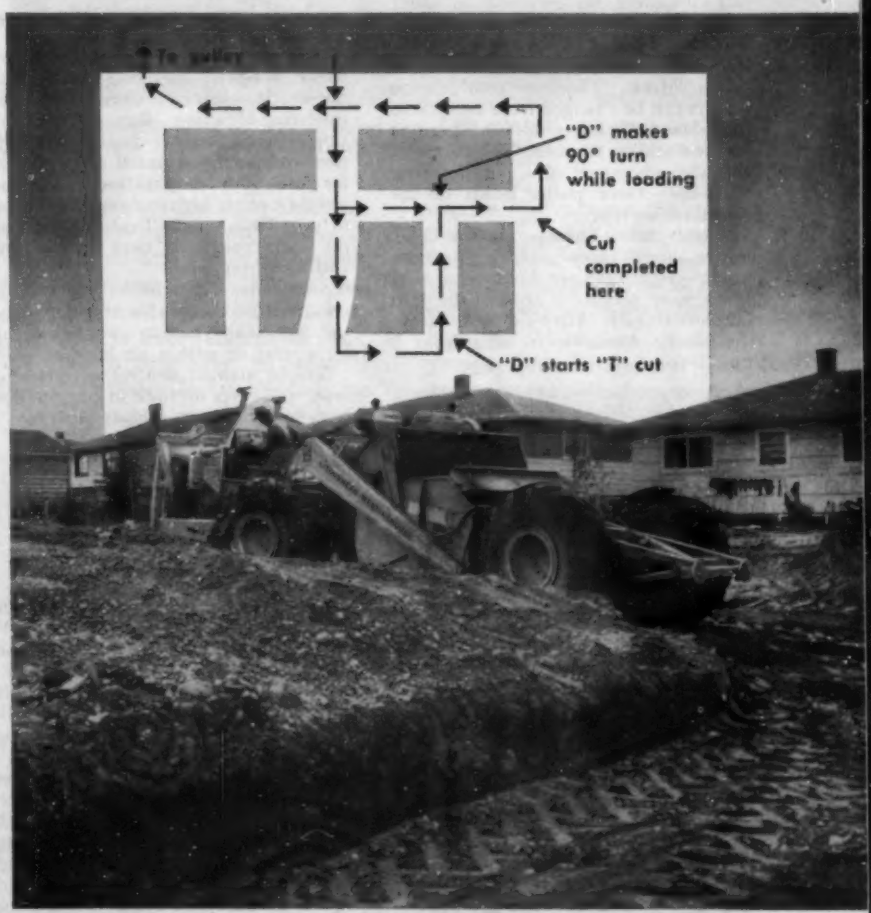
Tournapulls hauled material to nearby gulley, where it was spread to bring up lowland to housing grades. "The 'D' is ideal for this kind of work," says operator Neil Lauchlin. "You can really maneuver around these tight spots. It's good and fast, too!"

Turns 180° in 24'3"

Tournapull's positive electric kingpin power steer enables rig to turn around non-stop in an area only 24'3" wide . . . less than its own length. Rig can work in tight quarters and between buildings where other units cannot readily maneuver. "D's" eliminate time normally wasted shuttling back and forth to turn in restricted areas. No special turn-around areas need be excavated. Fast maneuvering Tournapull swings into cut position quickly. If pusher is used, it need not sit idle while scraper operator wastes time on a wide sweeping turn, and then on long, slow back-in.

Investigate today

Check the new improved D Tournapull. Find out what its short turn radius and high speeds can do for *you*. New "D" now gives you 9 cu. yds. heaped capacity. With 8' wide road clearance and axle-load within 9-ton limit, rig can be roaded almost anywhere without special permit. Send for complete details.



Loading in restricted quarters, D Tournapull negotiates sharp 90° loading turn — self-loads up to 5 pay-yards of gravel and sandy silt, grading for Alberta City lanes. Electric motors accurately control scraper blade, apron and tailgate as well as kingpin steer.

. . . for more details circle 296 on enclosed return postal card

Tournapull—Trademark Reg. U.S. Pat. Off. DP-1230-H-b

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

New Products

(Continued from page 108)

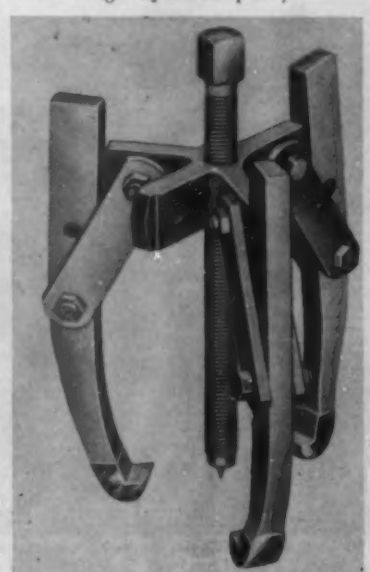
some as much as 39%, according to Timken Company engineers. Most capacity ratings have been increased by approximately 10%. This increased rating makes it possible to use smaller bearings in many applications which will result in a more compact product using less material, since the size of shafts and housings can be commensurately reduced. It may now be possible to use Timken bearings in new applications where they have not been practicable in the past.

For more details circle 106 on Enclosed Return Postal Card.

Combination Jaw Pullers, Increased Power for OTC Line

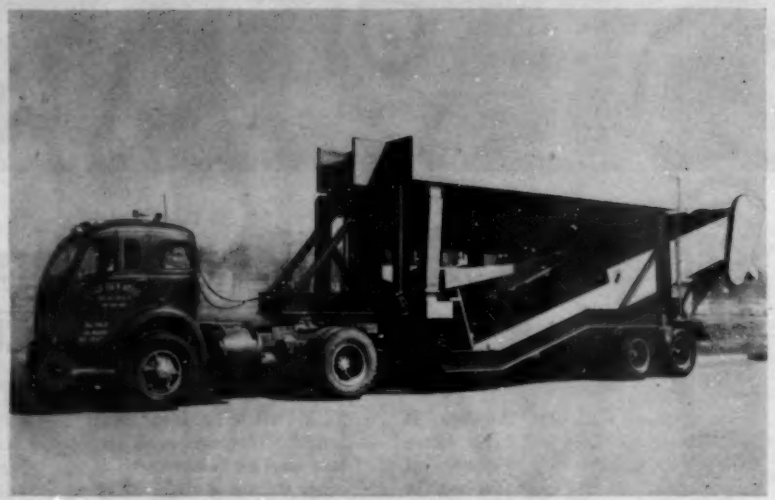
Two points for gripping or three points for gripping are available in a simple jaw puller announced by Owatonna Tool Co., 474 Cedar St., Owatonna, Minn. The new combination pullers can be changed from two-jaw to three-jaw pullers by simply shifting one jaw and adding another. The customer gets the advantage of six puller sizes with only three puller heads of the combination type.

These pullers incorporate the OTC power pitch thread which increases power 32%. Jaws are designed so that when more presure is applied the grip becomes tighter. They will not slip off the work. Available in sizes from 6 tons through 14 tons capacity.



OTC Grip-O-Matic Pullers

For more details circle 107 on Enclosed Return Postal Card.



Eagle Portable Sand Plant

Portable Washing-Classifying-Dehydrating Units for Sand

Complete sand washing-classifying-dehydrating sections on wheels are now available from Eagle Iron Works, 140 Holcomb Ave., Des Moines, Iowa.

The new units consist of a standard water scalping-classifying tank with automatic bleeder valves and 3-cell collecting-blending flume and two single screw washer-classifier-dehydrators, compactly mounted on a chassis, for use with semi-tractor. Size and weight permit highway travel from pit to pit. Unit can be hauled right into pit and positioned next to crushing and screening plant.

Side flares on washers are quickly removed, as shown, for travel. When site is reached section can be set up for operation within an hour or so.

Simple manual control of metering "splitter" gates on tank in conjunction with 3-cell flume adapts unit to a variety of pit conditions.

For more details circle 108 on Enclosed Return Postal Card.

40 Ton Lifting Capacity Plus Engineering Changes on Crane

New engineering features and increased lifting capacity for its 45-M crane have been announced by Marion Power Shovel Co., Marion, Ohio.

Formerly a 35-ton machine, the rubber mounted unit now has a rated lifting capacity of 40 tons at an operating radius of 12 ft.

Among the new engineering features is an improvement of Marion's power-up, power-down boom hoist, which lowers the boom one-half the raising speed at any given engine speed, and allows the operator to spot the load safely and accurately. The boom hoist is fully independent of other machine motions.

The gantry has been re-designed to improve the lead on the cable to give straight line reeving and obtain smooth wrapping of cable on the drum.

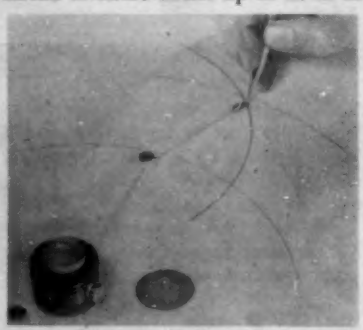
Carrier outriggers are on rollers for fast and easy setting. Light-weight aluminum floats have been added as standard equipment.

The 43-M can use up to a 100 ft. boom. For high lift crane service 15 and 30 ft. boom jibs are available. Maximum boom and jib length is 130 ft. Diesel drive is optional.

For more details circle 109 on Enclosed Return Postal Card.

Coin-Size Beam Compass Makes 12-ft. Circles, Spirals, Curves

A new turret shaped metal beam compass not much larger than a half-dollar coin, introduced by Laramie Chemical Corp., 290 Main St., Stanford, Conn., can disgorge enough tough linen thread to scribe circles up to 12 ft. in



Laramie "Sidewinder"

diameter, as well as many large, complicated involute curves and spirals.

The "Sidewinder's" measurements can be controlled to a tiny fraction of an inch by its linelocking clutch and its sensitive rewind knob. And because a machine formed pen or pencil grip-socket is clamped securely to one end of the line and the reel is anchored precisely to the surface at the other end, "large work" on wood, paper, fabric, metal, plaster or turf becomes faster and surer. Three interchangeable pins

(Continued on page 116)

Shortcuts to quicker, lower cost compaction

Earth swells when excavated. This "swell" varies from a low of 5 to 15% in sand or gravel, to a high of 30 to 62% in clay. When put into the fill, earth must usually be packed down to somewhere near its original volume.

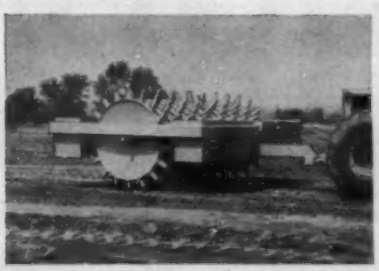
Compaction during normal travel across the fill is one of the bonuses you get at no extra cost with rubber-tired dirtmoving equipment.

Modern rubber-tired, self-propelled dirtmovers can help you achieve compaction results quicker and at lower cost. To help you meet compaction standards quicker and easier, here are some shortcuts:

1. Spread "on the run". Best spreading results are obtained when travel is at speeds corresponding to the rate of material flow from the scraper. Spread should be made within a distance of 65 to 100 feet and be completed in 30 seconds or less. This insures uniformity.

2. Build up your fill in thin, uniform layers 4 to 12 inches thick. The thinner the fill is laid down the easier it is to compact.

3. Blade the fill with a bulldozer or motor patrol. If neither of these tools is available, your self-propelled scraper can do double duty. Drop your blade with apron closed on every third or fourth return trip and level the fill. Your scraper will do almost as good a job of blading as a motor patrol.



Sheepsfoot Rollers with external ballast boxes and provision for drum loading have a wide range of foot pressures to meet various soil and compaction conditions.

The Sheepsfoot Roller is the most popular compacting tool, although rubber-tired and vibrating tampers are sometimes used. Before you begin to haul across a fill, be sure the earth is moist enough to pack. Sprinkle if necessary. A correctly designed Sheepsfoot will work the layers together and mix the water into the ground better than any other compactor.

A Sheepsfoot Roller seldom "walks" completely out of the foot depressions. It leaves the top 2 to 5 inches in a loose binder layer which is compacted at the bottom of the next lift. When the roller does "walk" out completely, loosen the surface with a disc harrow to maintain a good bond between lifts.

By carefully routing your self-propelled scrapers or rubber-tired tractors across the fill, you speed up compaction. Rolling action of the broad, low-pressure tires tends to confine and compact the soil under the tread rather than displace it. In its normal travel across the fill, the big rubber tires of modern earthmoving equipment may give as high as 80 to 85% of specified compaction. This is important as the fill nears completion, because rubber-tired machines will pack the top 2 or 3 inches that remain loose behind the Sheepsfoot Roller.

Success or failure of roads, airports and other structures built of earth depends on the condition of the fill. Proper compaction permits surfacing materials to be placed immediately and accurately. It helps make the fill watertight and allows it to carry heavier loads. If properly tracked on the fill, man-high 2-foot wide earthmover tires do an excellent job, often comparable to special compaction tools. Specified or not, compact every fill whenever possible. You'll do a better job of dirtmoving than the other fellow!

1566-DC-1

. . . for more details circle 297 on enclosed return postal card

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

LACLEDE pre-assembled dowel units

Save Field Labor...

Speed Highway and Airport Construction

All parts of Laclede dowel assemblies for expansion, contraction and construction joints (expansion sleeves, chairs, spacing devices) are precision-welded into one unit at the plant before delivery to the job. This pre-assembly insures an accurate easily handled one piece unit permitting fast installation with reduced field labor costs. The dowels are maintained in rigid alignment. Where specified, the units may be furnished painted or coated, eliminating a time consuming and costly job operation.

OTHER LACLEDE HIGHWAY STEELS:

- Multi-rib round reinforcing bars
- Center joints
- Tie bars
- Accessories

LACLEDE

LACLEDE STEEL COMPANY

SAINT LOUIS, MISSOURI ◆ Producers of Steel for Industry and Construction

. . . for more details circle 292 on enclosed return postal card

How tractor work-and-run mobility

puts dollars in your pocket

17 mph LeTourneau-Westinghouse Tournatractor®, rolling on big, 2' wide, low-pressure tires, is never more than a few minutes away from its next assignment anywhere in your work area. There's no delay ... no waiting for truck and trailer ... no loading or unloading ... no extra equipment or manpower expense. Operator just hops on, shifts into high, and he's on his way!

Takes shortest route to any job

Tournatractor always takes the shortest route — via road or cross-country. It travels over blacktop, city streets, sidewalks, curbs or RR tracks ... without planking. Big (5'11" high), low-pressure tires spread to distribute the load ... flex, and roll easily over obstacles.

Puts "wait-time" to work

When your Tournatractor gets caught up with its present assignment, there's no need to let it sit idle. Let its high-speed mobility pay off for you. Send this rubber-tired tractor to handle scattered odd jobs anywhere in the area. Use it for fast push-loading or towing ... for heavy dozing to improve haul-roads, detours, or drainage. In addition, unit's rubber-tired mobility lets you move freely from wet to drier work areas ... to fill in with profitable small jobs between big-job assignments. You'll find there's nothing like Tournatractor for handling more work over a wider area — without excessive tractor moving expense.

Provides quick emergency service

In only 10 minutes, mobile Tournatractor can be handling a critical dirtmoving task 2 miles away. With mobility like this, you can always be sure of prompt help ... when and where you need it. This quick emergency service — plus Tournatractor's flexibility of application for helping out and speeding up any behind-schedule operation — can save you thousands of dollars on a single contract. Also, machine gives greater efficiency on over-all operation, and can cut valuable days from your completion dates.

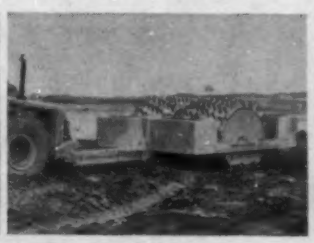
Meets all 4 dimensions

Besides mobility, Tournatractor has ample ability to meet the other 3 essential dimensions of today's earth-moving ... power, traction, and speed. Write for free 32-page illustrated bulletin, "All 4 dimensions".

CT-1463-DC-1

Optional attachments increase Tournatractor's range of application

ANGLEDOZER® — four-way adjustment permits angled blade to be tilted up and down on either corner — forward or back on either side. Excellent for side-hill work.



SHEEP'S FOOT ROLLERS — L-W tractor easily tows two or four-drum roller units. Tournatractor's big tires help complete specified compaction in fewer passes.

POWER-CONTROL-UNIT — rear-mounted doubled-drum PCU enables Tournatractor to operate any cable-operated scraper. Also powers other cable-type equipment.

BUMPER AND PUSH-PLATE — for pusher duty. Heavy, all-steel welded push-plate is 4'5" wide and 3'4" high. Full width bumper is 3" thick, 16" high, curved at ends.

NOTE: Snow plow and wing, root rake, heavy-duty winch, tree stinger, down-pressure attachment, cab, lights, 18-yd. electric-control scraper, also available.

. . . for more details circle 298 on enclosed return postal card

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

New Products

(Continued from page 112)

that come with it act as seating anchors, rewind handles and curvature guides. The compass can be used with pencil, ballpen or metal scriber.

For more details circle 110 on Enclosed Return Postal Card.

General Electric Introduces New Power Supply for Two-Way Radio

A new transistorized power supply designed to provide greater reliability

G.E. Transistorized Power Supply

in 2-way radio communication equipment and to effect substantial savings in component replacement has been developed by the General Electric communication products department, Electronics Park, Syracuse, N. Y., for use in the construction and concrete industries and other markets.

The unit replaces the receiver portion of the mobile power supply and, with life expectancy equal to that of an entire mobile combination, will help accomplish cost reductions in maintenance for both small and large fleet radio users.

For more details circle 111 on Enclosed Return Postal Card.

Instrument Explores Subsurface Down to 50 ft. Without Drilling

A new instrument for shallow subsurface exploration without drilling has been announced by Geophysical Specialties Co., 4206 Longfellow Ave., Minneapolis 7, Minn. The model MD-1 refraction seismograph is used for determining depth to bedrock, the presence or absence of bedrock or solid material at any depth up to 50 ft., and identification of subsurface materials without drilling. Features include miniature size, direct reading, and simple easily-taught operation. Using complete transistorization, the weight of the entire equipment exclusive of sledgehammer source is 16 lb.

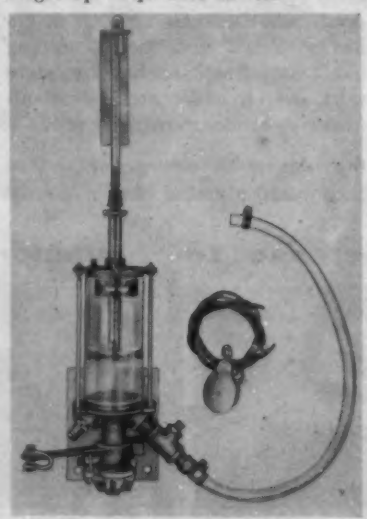
Refraction Seiesmograph

For more details circle 112 on Enclosed Return Postal Card.

Dispenser Gives Visual Observation of Air Entraining Agent

Transparent auxiliary tubes and a dispenser cylinder of clear acrylic plastic in the new Acme A-E-A dispenser, announced by E. W. Zimmerman, 228 North LaSalle St., Chicago 1, Ill., permits highway engineers to maintain constant visual observation of the flow of air entraining agent for concrete road mixes.

The Acme dispenser can be mounted on road pavers or stationary mixers. It dispenses a fixed amount of air-entraining agent into the water line. The discharge is timed so as to reach the water line approximately one second before the water is released from the measuring tank, thus insuring proper gauge-water addition. Capacity ranges up to 40 fluid ounces.



Acme Dispenser

For more details circle 113 on Enclosed Return Postal Card.

Drill Head Increases Air-Blast Drilling Speeds in Soft Rock

A new drag bit drill head, announced by Austin Powder Co., Cleveland 13, Ohio, is reported to greatly increase air-blast drilling speeds in soft rock formations.

Designated as Model APA, it is said to cut through soft shales, clays, shells, soft limestone, red beds and other rocks having low compressive strength in less than half the time required by ordinary drill heads with rotating bits. Also, the APA contains no independent moving parts to become clogged and requires only a moderate weight to achieve full effectiveness.

Of 3-wing prop-type design, the APA head is furnished with special patented carbide-tipped bits. The latter have tapered shanks that drive-fit firmly into the drill head so that wedges and set screws are not needed. Bits can be quickly changed with hammer and punch.

Austin APA Drill Head

For more details circle 114 on Enclosed Return Postal Card.

New Rotating Electrical Machines Give Constant Power Source

A new type rotating motor generator set developed by Kato Engineering Co., Mankato, Minn., is stated to provide continuous AC output despite possible AC input line failures.

Mounted on a common welded steel base and coupled directly together (see illustration) are from left to right, DC motor, AC motor and AC generator. Operating speed is 1800 rpm. Both the AC induction motor and the DC motor are 7½ hp. AC alternator rating is 3500 watts, single phase, 115/230 volts.

The DC motor is equipped with a speed control. When DC input fails,

Kato Motor Generator Set

(Continued on page 120)

"Handle small street job or big, long haul job with ease"

. . . says Texas dirtmover

George O. Walker of Dallas, Texas, sub-contracted to rebuild 1½ miles of an old asphalt city street in Garland, Texas. The job called for excavating hard-packed asphalt and tough black gumbo to grade. To handle this earthmoving assignment, Walker brought in two LeTourneau-Westinghouse C Tournapulls, with Fullpak* scrapers.

Fullpaks load asphalt without ripper

The 2 big 18-yd. "C's" loaded fast in asphalt, without benefit of a ripper. Big (43" x 16"), low (36" center), push-block gave pusher quick, solid contact . . . carried thrust direct to blade for maximum cutting power. Low, wide bowl design helped get a heaped load fast. Dirt slid in almost horizontally from 9½' wide cut . . . rolled back to fill corners . . . helped Walker cut load time to move big yardages fast.

Spread waste on fills and vacant city lots

To find a waste area for excavated material proved no problem for sharp-turning "C's". Loads were spread rapidly on vacant lots or in low spots alongside the road. In spite of some narrow, restricted spread areas, operators maneuvered the 18-yd. "C's" easily, and maintained good production.

J. K. Masan, Walker's superintendent, says, "*'C' Fullpaks are fast . . . capable of handling a small street job or a big, long haul job with ease.*"

Operator R. F. Carter comments, "I have operated many similar machines, but this Model C is the best all-around dirtmover I ever sat on." Operator John Rooney adds: "I like the quick-release bowl . . . Model C can't be beat."

See Fullpaks in action

Why not let us arrange to show you a C Fullpak in operation on your type of work? We'll be glad to prove how Fullpak's fast loading, spreading, and hauling can mean bigger dirtmoving profits for you.

▲ C Fullpak's low, wide bowl design helps get a heaped load fast on this city street in Texas. Dirt slides in almost horizontally from a 9½' wide cut . . . rolls back to fill corners . . . heaps bowl with less engine hp applied to lifting, more to cutting.

▲ Rebuilding old street in Garland, Texas, 18-yd. C Fullpaks load fast in hard-packed asphalt without benefit of a ripper. Big, low push-block on "C" carries thrust direct to blade for maximum cutting power.

◀ Because of its 6'1" apron lift, plus positive ejection tailgate, C Fullpak spreads rock or chunky materials fast. Tournapull's speedy electric controls give operator choice of dumping load, or spreading it accurately to any desired depth.

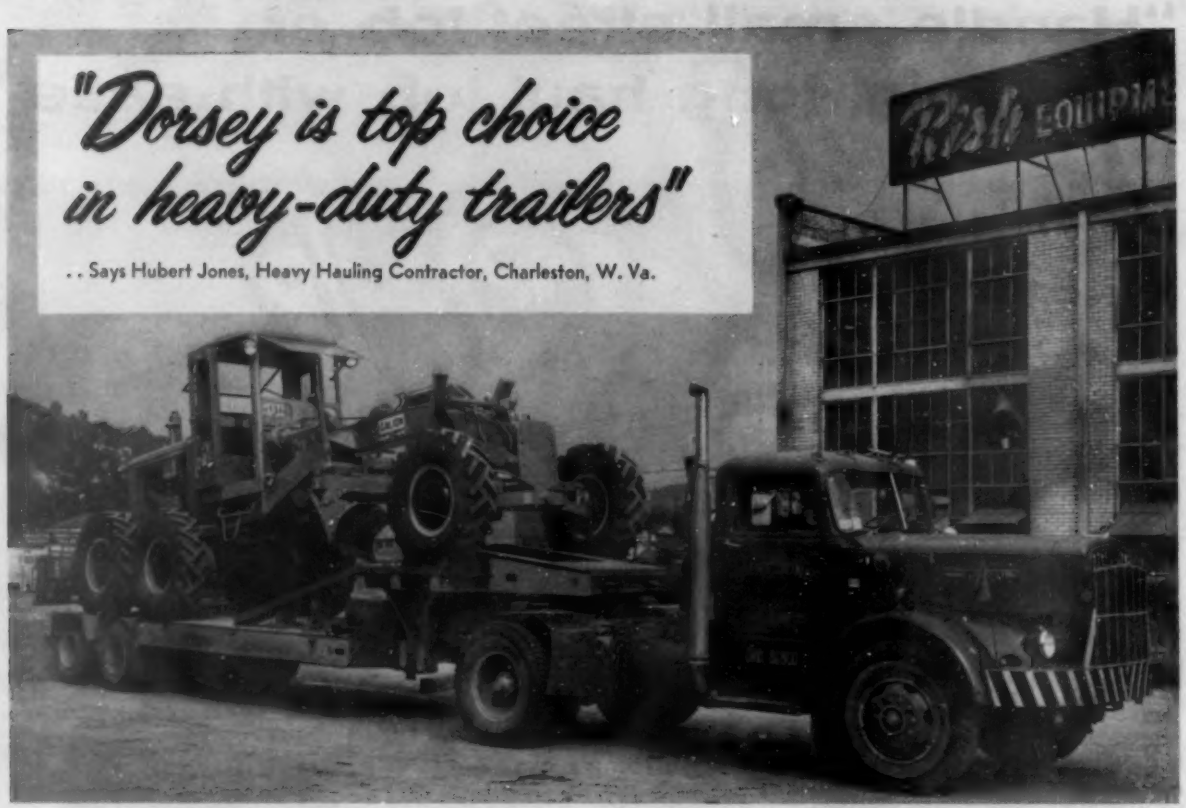
Tournapull—Trademark Reg. U.S. Pat. Off.; *Trademark CP-1387-DC-1

. . . for more details circle 299 on enclosed return postal card

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit



In the contract hauling business, Mr. Jones puts this Dorsey MTS (30-ton capacity) through its paces under all kinds of loads, month in and month out. The result is an outstanding record of ruggedness under capacity loads, with very low maintenance expense. Mr. Jones also reports his drivers like the way the MTS handles. Model MTS comes in capacities of 15 to 35 tons.

For every tough job, there's a tougher Dorsey

Check the "Specs"!

Before you buy any heavy-duty trailer, we suggest careful examination of the specifications. You will note that standard items on all Dorsey models include all lights, brakes and other equipment needed for highway operation, and that tires are full-sized for capacity loads.

MODEL HTS

20 ton capacity—Weighs only 8,250 lbs. (also available in 15, 25, 30 and 35 ton capacities)

Although as much as a ton lighter than other trailers of comparable capacity, high-tensile steel main channels and close-spaced all-welded cross members give the HTS superior strength and ruggedness. Flat gooseneck provides support for blades and other loads.

THE GIANT PLATFORM

52,000 lb. capacity—Weight: 8,280 lbs.

The Giant with its 18-inch deep main frame has earned its reputation as America's No. 1. platform. Although as much as 2,000 lbs. lighter than other platforms, it has even greater strength.

TANDEM TILT-TO-LOAD

25,000 lb. and 30,000 lb. capacities—Weights: 6,975 lbs. and 7,150 lbs.

Speed and efficiency as well as economy are combined in this versatile tilt model! It's so light a dump truck pulls it easily. Two-way hydraulic control is so precisely balanced the weight of a man will tilt it up or down. Single axle models also available.

DORSEY

For the complete facts on any heavy-duty trailer see your Dorsey Distributor or wire collect—

DORSEY TRAILERS – ELBA, ALABAMA

. . . for more details circle 267 on enclosed return postal card

In restricted areas,

Rear-Dumps outmaneuver, outproduce ordinary haulers

For fast maneuvering in confined loading areas... hauling heavy materials over poorly-graded winding roads, and dumping safely over high embankments... investigate the advantages of heavy-duty Tournapull® Rear-Dumps.

Short turns speed loading cycle

Take the 22-ton "C" Rear-Dumps, for instance... middleweights in the LeTourneau-Westinghouse line. In confined loading areas, where width of footing is limited, "C's" short 28'8" turn in haul position (only 20'8" in dump position) comes in mighty handy. It enables operator to maneuver safely and easily... spot fast under dipper. Compare this tight-turn ability with that of ordinary dump trucks in the "C's" tonnage hauling class.

Also, 'Pull's low rear-entry (5'8") lets shovel operator swing bucket in and out of bowl at low dumping heights. Shovel can heap a good load in a hurry, with minimum spillage.

3,762 sq. in. of brake surface

Multiple-disc air brakes on all 4 wheels give 3,762 sq. in of braking surface... provide ample safety for downhill haul.

A special safety feature for hilly work areas is the optional *Electrotarder*. It provides auxiliary non-wear, electric-resistance braking through generator on drive-shaft... virtually slows machine to a "walk" without braking.

Dumps fast, safely... keeps firm footing

To dump, operator wheels and spots fast at edge of target area. Setting independently-controlled rear-wheel brakes only, he activates electric hoist motor to raise body into "dump" position. As body raises, wheelbase shortens... swinging bowl below and between rear wheels. This keeps rocks, stones, etc., from piling under hauler or against rear wheels during dump. Front-wheel drive keeps power and traction on solid footing, well ahead of rear wheels.

Rear-Dumps have 4-way built-in protection against bogging down: 1) Power-transfer differential automatically transfers most of the power from slipping wheel to wheel on firm footing. 2) Power-steer through geared kingpin "walks" prime-mover out of ruts — should both drive wheels bog down. 3) "Hump" action, in dumping, brings rear wheels forward as body raises, pushes front wheels forward as bowl is lowered, to inch hauler out of soft footing. 4) Big, low-pressure tires on all wheels float over, don't dig into loose materials, keep traction always.

Interchangeability adds profits

Tournapull Rear-Dump's "bonus" is its interchangeability feature. Rear-Dump body can be easily switched with 18-cu. yd. scraper, 20-ton flat-bed hauler, bottom-dump or crane. Change-over, using same 2-wheel prime-mover, takes just a few hours.

Increase *your* earning power with this interchangeable unit. Handle more work at a profit... all year-around! There's a Rear-Dump size... 11, 22 or 35 tons... to match the capacity of your shovel. Ask for details.

CR-1205-DC-1

At this quarry, C Tournapull Rear-Dumps are loaded with rock and overburden by a large-capacity shovel. Here the machine's big air-brakes, simple electric controls, positive power-steer, and 90° turning radius, enable it to spot fast under the dipper, maneuver safely and easily over boulder-strewn surfaces.

'Pull's operator backs "C" right up to edge of embankment. Streamlined bowl sheds material readily, clear over bank. Clean unloading cuts costs for dozer cleanup. Front-wheel drive permits fast, safe getaway after dump.

for more details circle 345 on enclosed return postal card

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

New Products

(Continued from page 116)

an automatic transfer switch brings in the DC drive motor which operates from storage batteries or other DC source.

For more details circle 115 on Enclosed Return Postal Card.

New Tubular Wire Electrodes for Welding Slash Costs

New tubular wire electrodes, developed by American Manganese Steel division, American Brake Shoe Co., Chicago Heights, Ill., for open arc semi-automatic welding with its Amsco MF welder, is claimed to make hardfacing faster and easier and less fatiguing for the operator.

Weld metal is stated to be deposited up to 200 per cent faster with these Amsco electrodes. It is further claimed that welding is faster, deposits are more uniform and the quality of the weld is greatly improved.

The new tubular electrodes are 3.32 in. in diameter. Flux and hardfacing alloy, accurately proportioned for the proper weld deposit are held compactly within the drawn steel tube. Amsco offers two types of tube wire: S/A manganese wire coils for manganese steel buildup and repair applications and S/A 53 for hardfacing to resist both wear and impact.

Amsco Welder

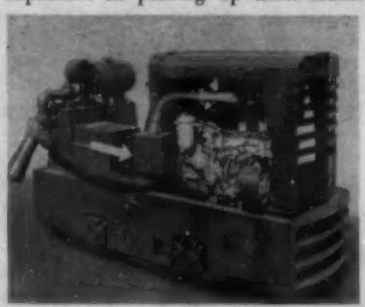
For more details circle 116 on Enclosed Return Postal Card.

Underground Diesel Locomotive Has Dieseler Catalytic Purifier

A 1½-ton underground diesel locomotive for mining and tunnel work, with fumes from its engine exhaust removed by a catalytic purifier, is being introduced by the Hack Engineering Co. of Denver, Colo.

The catalytic purifier, known as the Dieseler, is made by Oxy-Catalyst, Inc., Wayne, Pa. Oxy-Catalyst introduced the Dieseler in 1954 as an effective means of reducing noxious and irritating exhaust fumes of 4-cycle diesel engines.

A hydraulic driven unit, the new Universal locomotive is simple in construction, easily maintained and generates equal speed and power in both directions. It develops gradual power, important in picking up train loads.



Universal Locomotive with "Dieseler"

Powered with a Deutz diesel engine of 18 hp., it has a draw bar pull rated at 650-700 lb.

For more details circle 117 on Enclosed Return Postal Card.

Special Reinforcement Gives New Mucker Belt Added Durability

A new type of mucker belt, especially designed by B. F. Goodrich for conditions met in the 37,500-ft. Poe tunnel project, located 30 miles east of Oroville, Calif., has carried two-thirds of the more than 900,000 ton of rock excavated in that project.

Feature of the new belt construction is a special, interior fabric reinforcement designed to distribute shock loads from impact, improve cover adhesion and reduce stretch. The new construction provides its own cushion against load impact since the belts operate across a steel slider bed which affords no additional cushioning protection. Receiving the load is the severest trial for belts in this use.

For more details circle 118 on Enclosed Return Postal Card.

M-55 Truck Mixer Has Auxiliary System for Tempering Water

A new design feature of the model M series of truck mixers of Blaw-Knox Co., 300 Sixth Ave., Pittsburgh 22, Pa., provides an auxiliary system for introducing tempering water.

Blaw-Knox M-55 Truckmixer

The new system permits the operator to introduce mix water through the charging end of the mixer as well as through the drum head. Several advantages are inherent in adding water through the charging end of the drum, according to Blaw-Knox.

Principal advantage in adding water through the charging hopper on high discharge mixers is that it eliminates the tendency of concrete to build up on mixer blades at the drum opening, as the tempering and flush water is jetted against the blades.

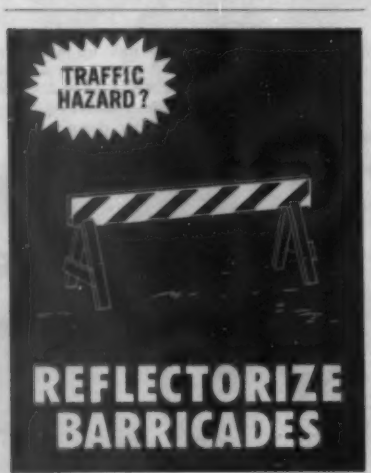
For more details circle 119 on Enclosed Return Postal Card.

Adjustable Height Gantry Has Double Duty End Supports

An adjustable height gantry, light enough to be erected anywhere by two

Wallace Gantry

(Continued on page 124)



. . . FOR ONLY 35¢

Fast, one-step reflectorization as easy as painting! Hazards reflectorized with 3M's "Codit" Liquid flash brilliant warning at night for safety. Treatment costs a low 17¢ per square foot. Buy supply from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minnesota.

Get "Codit" Reflective Liquid in 6 oz. aerosol spray or 4 lb. can or complete safety kit.

3M

For more details circle 338 on enclosed return postal card.

Fast, accurate work . . . at lower cost with *electric control* Tournapulls

One reason modern LeTourneau-Westinghouse Tournapulls are so fast-working is because they are controlled with the smooth, clean, *instant* power of electricity. With fast, dependable electric controls, your operator does *more* work . . . *higher quality* work . . . and maintenance costs are lower. Here's why:

Exclusive fingertip controls on dash

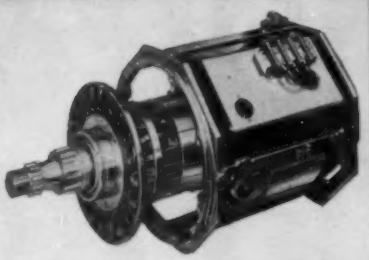
On all L-W Tournapulls, operator steers . . . operates scraper bowl, apron, and tailgate . . . just by moving small electric control switches on dash. When switch is pressed, point-of-action motor is immediately activated. Action stops the moment switch is released . . . or stops *automatically* when pre-set limit of travel is reached. Because control is so easy, operator works faster . . . more accurately . . . with less fatigue.

Simple, trouble-free electrical system

A heavy-duty AC generator — mounted in line with unit's diesel engine — supplies power for steering and control motors. Pressing dash-control switch sends current *through flexible insulated wires* to weatherproof, high-torque, point-of-action motors. Spring-loaded brakes are released, and motor turns at top speed — within ¼ second. Electric power is converted, through gears and short cable, to desired action at the apron, tailgate, or bowl hoist . . . and through gears to kingpin steering control. Operating electricity is generated only when point-of-action motors are in use. There's no continuous drag on the engine, to rob horsepower and add to fuel costs.

Low maintenance costs

More than 19 years of experience building more than 13,000 self-propelled scrapers — in service all over the world — proves the merits of this exclusive L-W electric-control system. Eliminated are troublesome repairs and adjustments common to hydraulic or mechanical systems. With Tournapulls, you convert time saved on downtime and maintenance to production time. Also, Tournapull® scrapers normally use only about half the lubrication of competitive self-propelled scrapers . . . further reducing operating costs.



Weatherproof motors are "squirrel-cage" type, operating on AC current. Simple, compact — motors consist of only two foolproof parts; rotor and stator. They always give same, swift action — no matter how cold, hot, wet or dusty it is.

300-volt, 3-phase, AC generator — bolted to prime-mover's engine flywheel — supplies power for steering and control motors. Transmission of power through electric cables eliminates problems of lubrication, breakage, leakage, high-pressures, and clogging of hydraulic and mechanical control systems. Generator may also be used as an emergency source of electric power.

Ask for complete information

Write today for details on Tournapull's many *profit-making* features. 3 scraper sizes: 9, 18, 27 yards. Same electrical system powers interchangeable haul units . . . rear-dump, crane, and self-loading flat-bed.

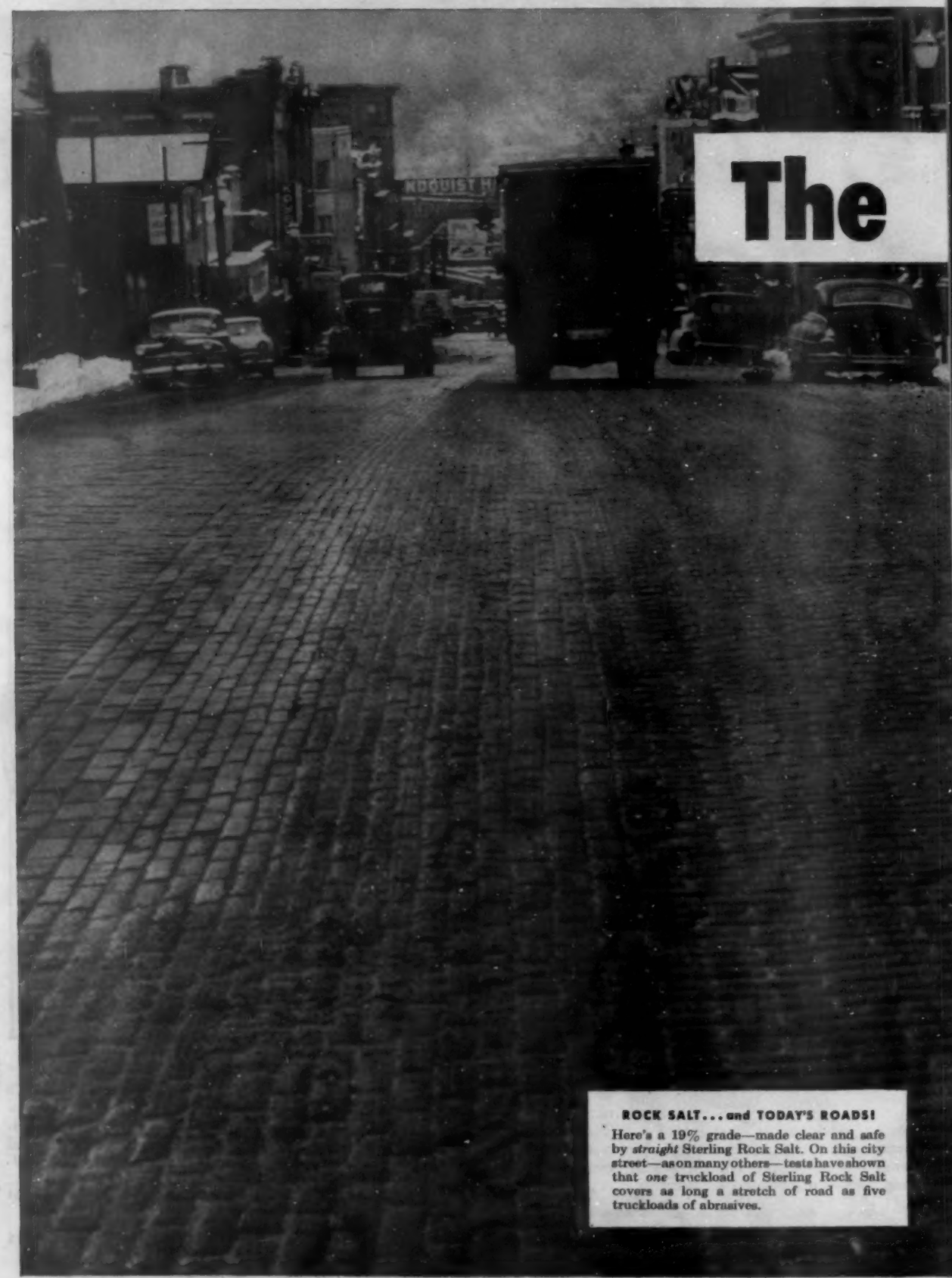
P-1466-DC-1

. . . for more details circle 346 on enclosed return postal card

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit



ROCK SALT... and TODAY'S ROADS!

Here's a 19% grade—made clear and safe by *straight* Sterling Rock Salt. On this city street—as on many others—tests have shown that *one* truckload of Sterling Rock Salt covers as long a stretch of road as five truckloads of abrasives.

only safe pavement is a bare pavement!

...and only straight rock salt can give you bare pavements during winter storms!

There's a growing trend today to the use of *straight* Sterling Rock Salt for ice and snow control. Reason: The increasing volume of traffic during winter months has created a critical need for bare, safe road surfaces during storms. And experience has shown that abrasives—even when mixed with salt—*just don't do the job!*

Actually, sand and cinders are inert. They don't melt hard-packed snow . . . have no effect on ice, sleet and freezing rain. And they do not provide traction for any length of time. Wind and traffic quickly scatter abrasives to the side of the road!

Here's a typical report on abrasives: "During a heavy, continuing snowstorm, sand and cinders don't help us at all. No matter how thickly spread, these abrasives are soon covered by as little as ¼" more snow. Frequent, costly reruns are often needed. What's more, abrasive layers seem to retard the natural melting process."

The answer is straight Sterling "Auger Action" Rock Salt. Problems simply don't occur when streets are cleared with this effective melting agent! Sterling Rock Salt helps turn snow into slush—quickly. And when ice forms, the salt crystals (with exclusive "Auger Action") *bore* through the ice layer to the road surface. Here, brine is formed . . . and spreads out to break the bond between ice and pavement!

Sterling Rock Salt has superior melting power at low temperatures, too. All that's necessary is to increase the amount of salt used as the temperature falls. This melting agent leaves no expensive clean-up jobs. It combines with the snow and ice it melts, and runs off the road leaving a bare pavement—the *only safe pavement during winter storms!*

Now's the time to complete your stockpiling of Sterling Rock Salt. Remember, winter demands can make deliveries uncertain!

You can protect rock salt from caking in storage with new Sterling Storite. This remarkable chemical keeps salt free-flowing, ready for immediate use. Send for free booklet giving full details.

International Salt Co., Inc.
Sales Offices: Atlanta, Ga.; Chicago, Ill.; New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N. J.; Buffalo, N. Y.; New York, N. Y.; Cincinnati, O.; Cleveland, O.; Philadelphia, Pa.; Pittsburgh, Pa.; Richmond, Va.; and Memphis, Tenn.

STERLING "Auger Action" ROCK SALT

International Salt Co., Inc. • Scranton 2, Penna.

. . . for more details circle 290 on enclosed return postal card

New Products

(Continued from page 120)

men has been announced by B. E. Wallace Products Co., Exton, Pa. Maximum height is over 14 ft. The legs have 6-ft. adjustment. The I-beam, of a light, aluminum alloy is 10-ft. long and weighs only 65 lb. Each of the end supports is a complete tripod, which can be removed from the I-beam in a few seconds, and used as a conventional tripod. These tripods tuck nicely against the I-beam for easy hauling and compact storage.

For more details circle 120 on Enclosed Return Postal Card.

Little Giant EL-C Sweeper

Sweeper With Independent Engine Available for any Tractor

A new end-loader sweeper, model EL-C, which can be mounted on the front of any tractor end-loader, has been developed by Little Giant Products, Inc., 1530-50 N.E. Adams St., Peoria, Ill.

The EL-C has a left hand drive permitting sweeping in gutters and near the curb. The arms of the end-loader can be raised while the brush is rotating. Speed rotation of the brush is constant and entirely independent of the prime mover.

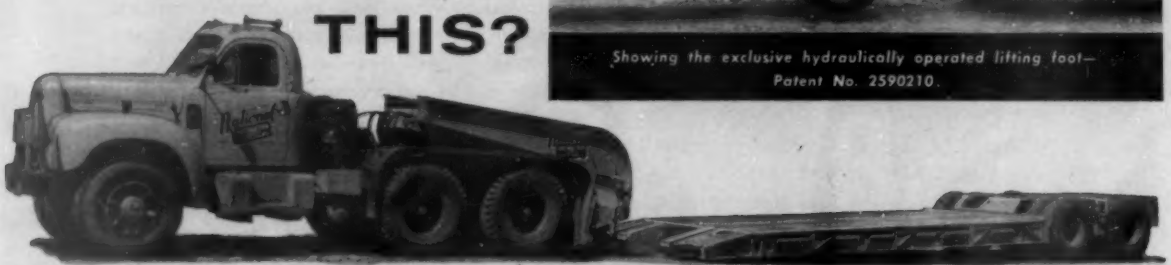
The end-loader sweeper is available in brush length of 6 or 7 ft., filled with either palmyra fiber or spring

(Continued on page 125)

LOW BED USERS-

'ever see a trailer LIKE THIS?

Showing the exclusive hydraulically operated lifting foot— Patent No. 2590210.



ROGERS HYDRAU-LIFT *Hydraulically-Operated* **DETACHABLE GOOSENECK TRAILER**

CAN YOU unload, reload and be moving again in as little as 3 minutes ?

CAN YOU load from the front without using blocking or turning equipment on deck ?

CAN YOU avoid detouring or unloading, moving ahead and reloading by traveling with front of deck lowered or raised to pass under or over obstructions ?

CAN YOU discharge overhanging loads by raising deck, blocking up load, lowering deck and pulling trailer out ?

CAN YOU raise trailer wheels to change tires or wheels of tractor while attached, to service tire or install chains ?

CAN YOU carry dippers, bulldozer blades, etc., on an unobstructed gooseneck ?

PACKY SAYS: It's almost like sitting down and letting the load slide off your back.

YOU CAN handle these operations and more with this new ROGERS Gooseneck Trailer. No winch is required saving up to $900 in cost and up to 1000 pounds in overall weight. Write for illustrated literature.

ROGERS BROTHERS CORPORATION

ORCHARD STREET • ALBION, PENNA.

Export Office: 50 Church St., N. Y. 7, N. Y. • *Cable Address:* "Broscites"

. . . for more details circle 314 on enclosed return postal card

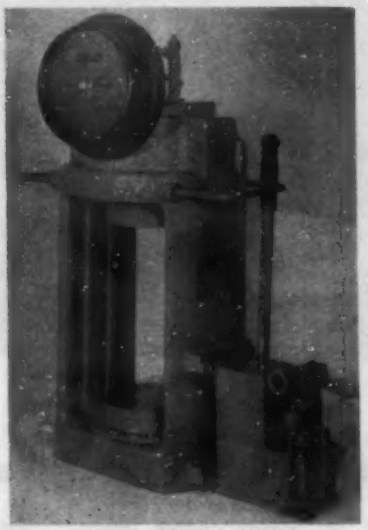
steel. The brush can be turned end for end to give even wear.

The new sweeper comes equipped with an independent engine, a choice of either a Wisconsin 7-hp AEN or a Wisconsin 14 hp TH.

For more details circle 121 on Enclosed Return Postal Card.

125-ton Portable Concrete Tester Can Apply Loads Up to 8850 PSC

A new model FT-25 tester, announced by Forney's Incorporated, tester division, P.O. Box 310, New Castle, Pa., can apply controlled loads up to 8850 psc on standard 6 by 12 in. concrete cylinders.



Forney Concrete Tester

Weighing no more than the 100 ton tester, the FT-25 features a Bourdon tube gage with an 8 in. diameter dial calibrated in pounds 0 to 250,000 with 500 pound sub-graduations, as standard equipment.

Available as standard accessory equipment are metric gages, and apparatus for testing 2 in. x 2 in. and 6 in. x 6 in. cubes, 8 in. x 8 in. x 16 in. blocks, and beams up to 40 in. long by either center or third point loading. A constant flow electric pump is also available.

For more details circle 122 on Enclosed Return Postal Card.

New Batch Body Offers Three Bigger Legal Payloads

An entirely new truck body capable of hauling and unloading four full batches of cement within legal load limits is now being manufactured by Anthony Co., Streator, Ill.

The body features three batch gates and four cement boxes. Each gate is air-controlled by a double throw switch in the cab. Twelve volt solenoid valves operate the air cylinders. The moisture resistant cement boxes are firmly anchored, yet can be removed

Anthony Cement Batch Body

almost instantly. Each is full enclosed and has a capacity of 12 cu. ft. The body, 11½ ft. long, has a capacity of 8 cu. yd. without the cement boxes.

A lighter weight body and hoist construction and a more even weight distribution over the 10 wheels enable the truck to haul bigger legal payloads.

For more details circle 123 on Enclosed Return Postal Card.

25 Ton Crane with 30 ft. Boom Needs Only One-Man Operation

A new 25-ton self propelled crane, model SP-425, added to the Lorain line of power shovels and cranes of Thew Shovel Co., Lorain, Ohio, is said to need but one man for operation, as all controls for carrier as well as turntable operations are located at the operator's position in the cab.

Many new developments in the shovel-crane industry introduced recently by Thew are incorporated on this model. Among these features, offered as standard equipment on the "SP-425," "Shear-Ball" mounting that eliminates all types of turntable rollers, center pins and centering gudgeons, and a 30-ft., pin-connected crane boom of alloy steel of the new Lorain square-tubular-chord design for increased lifting capacity.

For more details circle 124 on Enclosed Return Postal Card.

Vibrating Force Can Be Altered Quickly on New Type Roller

A new tow type vibratory roller with a drum 40 in. in diameter and 60 in. long has been added to the line of compaction equipment of Browning Mfg. Co., 111 Humble Ave., San Antonio, Tex. The roller weighs approximately 3500 lbs. and the vibrating unit is driven through V-belts by a model VF4 Wisconsin 4 cylinder air cooled engine. The vibrating force can be easily altered as desired and by throttle control on the governor of the engine the frequency of vibration can be set to meet material conditions at any speed ranging from 1000 to 2200 vibrations per minute.

BMCO V-60 Vibratory Roller

For more details circle 125 on Enclosed Return Postal Card.

New Welding and Cutting Outfit Welds to ⅜ in., Cuts to 2 in.

An improved model of its Prest-O-Lite 420 welding and cutting outfit capable of welding up to ⅜ in. and cutting up to 2 in. has been introduced by Linde Company, Div. of Union Carbide Corporation, 305 E. 42nd St., New York 17, N. Y.

This outfit still includes the per-

(Continued on page 128)

Lorain Model SP-425, 25 Ton Crane

ON THE CONNECTICUT TURNPIKE

No place for trucks you have to "baby"! Gammino's Macks are hauling close to *seven million* yards of rock and earth as the Connecticut Turnpike is rushed to completion. That means those mighty shovels are really moving as they drop the heavy, jarring loads of rock into the trucks beneath. It also means that Gammino's Macks are taking tremendous punishment, both from the hustling shovels and from the makeshift roadbeds over which they operate in an endless loading-dumping cycle.

"Sure, it's backbreaking work for any other truck," says Mr. Gammino. "That's why we use Macks."

No job's too tough for Gammino, because... THEY

Want the <u>real</u> pitch on Mack can-do?

Ask Frank Gammino of M. A. Gammino Construction Company, Providence, Rhode Island. He'll talk Macks with you all afternoon.

Ask him about the small but important jobs, where Mack economy enables him to deliver at a profit.

Ask him about the big jobs, where the power and schedule-meeting dependability of his Macks pace the entire operation.

And ask him about the really rugged jobs—the chassis-jolting rock-loading jobs . . . the up-to-the-hubs-in-mud jobs . . . the jobs where his Macks work round the clock, rushing out big-yardage loads for weeks on end without a break or a breakdown.

Then ask him why he has still *more* Macks on order. We'll stand on that. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

YEAR AFTER YEAR IN THE U.S.A., MACK DIESEL TRUCKS OUTSELL ALL OTHERS

ON THE PROVIDENCE RIVER BRIDGE JOB

Gammino's Macks are keeping big buckets busy. Concrete, not excuses, is what this job calls for—any late deliveries mean expensive, profit-robbing delays. "With Macks on the job," says Mr. Gammino, "no one sits on his hands."

DEPEND ON MACKS

. . . for more details circle 303 on enclosed return postal card

ON OVER-THE-ROAD HAULING OF CRUSHED STONE AND DIRT

. . . a wise contractor keeps a close eye on running costs—fuel, maintenance, down time, tire wear, etc. Mr. Gammino does just that, and he reports: "Nothing touches a Mack for ton-mile economy."

MACK
first name for
TRUCKS

5297

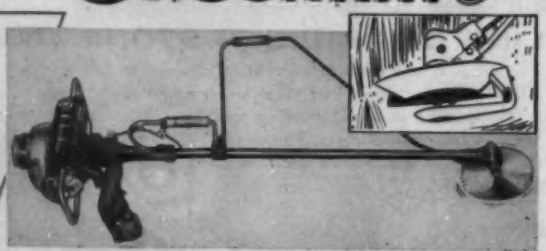
It's the TAMPO TEAM for COMPACTION

- SELF PROPELLED PNEUMATIC
- PNEUMATIC TIRED ROLLERS
- 50 TON COMPACTORS
- SHEEPSFOOT ROLLERS

A complete line of efficient TAMPO compaction equipment is available through your local dealer to meet the flexibility and variety required for every job condition or specification.
Write for latest bulletins and name of your nearest dealer.

TAMPO MANUFACTURING COMPANY
DEPT. 2 • P. O. BOX 2340 • 1146 W. LAUREL ST.
SAN ANTONIO, TEXAS • PHONE: PE-3-9171
. . . for more details circle 323 on enclosed return postal card

REDUCE BRUSH CLEARANCE COSTS . . . MECHANIZE WITH PORTABLE, POWERFUL ROWCO BRUSHKING



Rowco Mfg. Co., Inc., 82 Emerald St., Keene, N. H.
Subsidiary of Harrington & Richardson, Inc.—Est. 1871 In Canada: H and R Arms Co., Ltd., Montreal 23, P. Q.
Please rush me illustrated literature on Brushking
Name _____
Street _____
City & State _____

Clears all brush, grass and weeds!

Easy does it . . . when your crew is working with amazing BRUSHKING! Clears all brush and grass . . . even small trees. Goes anywhere, reaches down gullies, ditches; cuts close to fences, rocks, posts. Will cut costs 80% by replacing the use of scythes, axes, brush hooks. Rugged, dependable, fully guaranteed. Absolutely safe and easy to operate . . . Thousands in use throughout the world.

Write for full details
. . . for more details circle 316 on enclosed return postal card

New Products

(Continued from page 125)

formance proved Prest-O-Lite 420 blowpipe which welds, cuts, heats, and brazes without a cutting attachment. However, some changes now make the blowpipe even easier to use, for example: the cutting oxygen lever has

Prest-O-Lite Welding Outfit

been moved to the top of the handle where it can be turned on or off with the thumb. A green plastic ring has been placed around the oxygen valve and a red ring around the acetylene valve for quicker and more positive identification.

For more details circle 126 on Enclosed Return Postal Card.

New Concrete Saw Blades Give 2½ to 5 Times Greater Cut

Two new concrete saw blades have been announced by Diamond Tool Associates, 940 E. El Segundo Blvd., Hawthorne, Calif.

Diamond Tool Saw Blade

Since the inception of their new Trimetric process, Diamond Tool Associates has improved the quality of their diamond cutting blades and with these two new blades they are stated to have achieved a new high in the footage cut for both green and cured concrete. Tests run in the San Diego and Los Angeles areas are stated to have showed 2½ to 5 times more footage cut.

For more details circle 127 on Enclosed Return Postal Card.

(Continued on page 159)

The Pile Driver in Road Construction

By G. R. Compton, Jr.

Vice President, Pile Hammer Division, McKiernan-Terry Corporation

When is a single-acting pile hammer best? When double-acting? What kind of handling equipment and type of power are most effective for your job? These and other job factors are discussed from the highway contractor's special point of view.

THE PILE HAMMER and the pile driving rig have become major tools in the highway program, which will require thousands of new bridges and other structures necessitating pile driving.

The application of the pile hammer and the pile driver as a road builder's tool has created new problems for the traditional pile driving contractor and for the pile hammer manufacturer. Pile driving along the superhighway differs from pile driving for heavy construction. Small quantities of pile often must be driven great distances apart. Pile installations must be made in remote locations. Pile operations must be accomplished quickly and efficiently in congested city streets. The equipment utilized to fill these requirements must be built for highway jobs: it must be lighter, more mobile, more efficient, more durable, and faster operating.

McKiernan-Terry Corporation, for example, one of the principal manufacturers of pile driving equipment, for several years has been building and offering to the road builder complete equipment designed specifically for installing sand drains. The company is building a new line of diesel pile hammers completely self-contained units needing no auxiliary boiler or air compressor. They introduced at the recent Road Show, in Chicago, a new compound steam-air pile hammer said to be more efficient than any previously built machine.

Pile hammer leads, the structure built to convert a crawler crane into a pile driver, have been given special attention by our engineers and the light weight, more mobile result was also exhibited at the Road Show.

Hammers are being produced which require no prime mover, or prime movers of more modest size, to reduce equipment rental and moving costs. New hammer designs are featuring more favorable ram to net-weight ratios to pack more power in lighter equipment. The incorporation of self-stopping features in pile hammers eliminates the old worry about their self-destructiveness.

Up-to-date metallurgy applied to pile hammer design assures the presence of trouble-less equipment on today's fast moving constructive projects. Now, when pile hammers have become an essential tool for the road builder, the modern, efficient, durable and dependable pile hammer with its associated equipment, is available to him. This availability is important because the successful bid and award of contracts for road jobs depend greatly on two factors, possessed to a greater

Scene Above **A new compound steam-air hammer being used to drive steel H-beams for work on the Connecticut Thruway. This hammer, the McKiernan-Terry C-5, was introduced at the ARBA Road Show after more than a year of exhaustive field tests. Designed for economy and extremely low total weight to ram weight ratio.**

● A diesel pile hammer being used on the Niagara Expressway to drive 10-in., 42-lb. H-beams ranging from 50 to 55 ft. in length. The DE-30 shown, one of three McKiernan-Terry models with rams ranging from 2000 to 4000 lb., delivers 45 to 55 strokes per minute with an average energy per blow of 18,000 ft.-lb. Completely self-contained, light and mobile.

or lesser extent by the contractor and his personnel—their equipment and their know-how. This holds for any project from the largest entire operation to the smallest subcontract. Pile driving operations appear to the novice as simply placing a pile in the ground. Yet, experience has shown that ignoring the multiplicity of factors and the various types and sizes of equipment involved in pile driving will often result in lost awards or lost profits for the contractor.

On first glance the equipment required to drive pile would appear to be only a hammer, a means of lifting the hammer and pile, a guide for hammer and pile, and motive power for the hammer. Actually, for many years these requirements were met by primitive equipment such as a heavy weight, a hoist for both weight and pile, and a wooden guide structure. And, until the demands of modern road construction contracts were felt this equipment proved satisfactory.

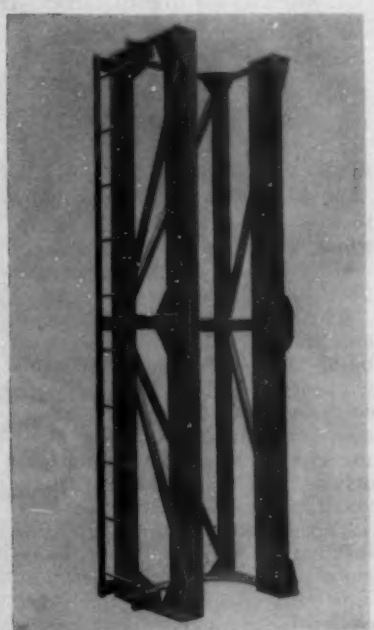
With increasing needs for greater speed and greater mobility and for more economical use of manpower and equipment in road building operations, the contractor required more efficient and reliable pile driving equipment. He welcomed the development of an automatic hammer that operated faster and easier, with less wear and tear on his associated equipment. He obtained greater mobility by devising a means of adapting his power crawler-crane to his pile driving operations. He sought a better selection of prime movers to operate his crane and his hammer. His search for better, faster and cheaper means of performing this one basic operation, pile driving, continues unabated.

Today, the proper selection and use of pile driving equipment has become a specialty in itself. McKiernan-Terry Corporation offers 23 different sizes and four different types of pile hammers. To choose the best and most economical hammer for any particular job is a major task for the average contractor, his experience and judgment, supplemented by that of the equipment manufacturer, are his guides, and his profits are the measure of his successful selection.

Many considerations enter into the selection of the proper pile driving equipment for a job. First is the composition, length, weight, and shape of the pile. Second, and of no lesser importance, is the composition and stratification of the soil into which the pile will be driven. Also of major import are the engineer's specifications for the piling: its load-bearing specifications or its other ultimate use. Thought must be given to the associated equipment available to the road builder for the job, such as the crane, the hammer and pile support and the prime mover for the hammer. Upon examination, each pile driving operation will prove to have its own individual problems and its own best solution.

Single-acting pile hammers, in which the ram is lifted by the motive fluid and dropped by gravity, have been used most commonly for load-bearing pile driving operations and almost exclusively for low-compressive strength piles, such as precast concrete. This type of pile hammer design, due to its low motive fluid requirements, has been applied to the most powerful hammers available. Its disadvantage is its relatively low frequency of blow, from fifty to sixty per minute, requiring more time for pile penetration. In considering economies of operations, the single-acting pile hammer is now generally selected for jobs on which extremely heavy or low-compressive strength pile will be driven, or for work where the pile will be driven through tough, rubbery types of soil.

Double-acting pile hammers are those in which the ram is lifted by motive fluid and is dropped by gravity reinformed by motive fluid pressure. They have always been preferred for driving steel sheet piling and have also been used extensively to drive load-bearing pile through common soils. The high-frequency blow of the double-acting pile hammer, from ninety to one thousand blows per minute, results in driving the pile faster, specifically by keeping the pile moving and preventing soil friction from impeding its progress. Their disadvantage is their relatively high impact velocity resulting in pile head deformation in low-compressive strength pile. Double-acting pile hammers are the most versatile hammers and are now generally



● New, light-weight pile hammer leads, designed for attachment to crawler and truck cranes, feature all-welded tubular sections that give high strength and rigidity with minimum weight.

selected for general pile driving operations of all kinds.

Having chosen the type and size of hammer on the basis of the type and weight of pile, the soil characteristics, and the ultimate design specifications for the pile, the best method of handling the hammer must then be selected.

Generally, in modern road construction operations, a power crane is used to lift the hammer and the pile. Unless the pile has been set in advance, as in the case of most steel sheet piling operations, the pile hammer can not be hung free and unsupported on the crane load line during driving. It must be supported in some manner that permits releasing the tension on the crane load line and allowing the hammer to follow the angle of entry of the pile. Even in the case of preset steel sheet piling, the hammer is generally fitted with "pants," or some other base attachment that holds the free hammer centered upon and in vertical alignment with the pile when the load line is released.

From base attachments for pile hammer support, the next step is to a type of rail lead on which the hammer rides and is guided, holding the hammer in line with the pile. The simplest lead is an "I" beam or "H" beam spud to which the hammer is fastened by grapples which grasp and slide along one flange of the beam. Such a lead is easily maneuverable and is usually light in weight.

Fabricated Leads

Fabricated lead structures are generally thought most desirable for accurate pile driving operations. These hammer and pile supports range from the very simple swinging leads which are suspended from one crane load line to the most complicated structures: attached to the crane boom point by hooks engaging the sheave pin, fastened to the crane cab through an adjustable bottom brace or spreader, and often extended to carry their own sheave head well above the boom point. Lead structures can be built for use at extreme forward and backward angles to drive batter piles, to swing to one side or another for the same reason, and to contain telescopic sections for guiding the pile hammer below grade and below water.

Hammer support must be selected on the basis of the site restrictions, the pile type, the pile pattern and the lifting equipment available. Improper choice of equipment for hammer support and pile guidance can severely penalize a pile driving job. This it does by requiring time-consuming maneuvers which may cause damage to piles or hammer, and by requiring excessively large and costly equipment to hold the hammer and its support.

The selection of equipment to power the pile hammer can also have a very definite bearing on the costs of pile driving operations. To power the hoist for a drop hammer and later to power the automatic hammer, coal-fired vertical, fire-tube boilers were generally used. Their movement, installation, coal storage, and firing characteristics all placed costly restrictions upon the pile operation.

Oil Fired Boilers

With fuel oil available to simplify fuel stocking problems and firing methods, the road builder doing pile driving now finds an advantage in oil-fired boilers. The portable gasoline or diesel engine driven air compressor aids further to reduce prime mover operating costs, eliminating the need for water and supplying motive fluid for the hammer almost instantaneously.

The relatively high investment for air compressor, and the need for two or more units to operate the larger hammers, has created a market for the fast-steaming, light-weight steam generators. Most recently, the diesel pile hammer, a one-cylinder, two-cycle diesel engine in which the piston is the hammer ram, has been introduced to the construction market. The diesel hammer entirely eliminates the need for any prime mover. To reduce over-all pile driving costs serious study must be given to the initial costs, operating costs and the necessity for mobility and installation of the prime mover for the pile hammer.

Good Equipment Care

Finally, when the equipment and the method for its use have been selected, the best insurance that costs will remain within the estimate is a realistic maintenance program. Manufacturers know about the difficulties into which their equipment can run and they know how these can be avoided. They make definite recommendations regarding the care of the equipment they produce. Operation restrictions, lubrication schedules and replacement schedules recommended by the manufacturer and adhered to by the road builder all combine to provide more efficient operating equipment and also prevent the exorbitant costs of equipment downtime.

● Chicago has placed 37 new mechanical street sweepers in service in recent months, bringing the total of such units to 102.

More Nozzle Capacity for Big Sprinkler

Seeing the economy of high-speed moisture application on grading work, Charles L. Harney, Inc., San Francisco, mounted International U-1 carbureted power units on the rear of six water trucks for use in the San Francisco area. The 3,000-gal. trucks and "accessories" are used to moisten base rock mixtures to assure proper compaction. The power unit actuates a small Pacific pump which delivers water at 100 gpm and sprays it over a 25-ft. radius.

Job: *remove 1,000,000 cobblestones*

plus 30,000 square feet of concrete

Loading costs threaten profits until N.Y. firm buys this 2¾ yd Michigan

Due to extremely rigid job specifications and unusually tough material, Triboro Asphalt Company, Flushing, New York, faced a substantial loading problem in stripping 31 blocks of six-lane Third Avenue in Manhattan. Recognizing the advantages of a single machine with speed and power to keep costs from getting out of hand, they asked NYC distributor United Tractor & Equipment Corporation to demonstrate a 2¾ yd Michigan Tractor Shovel. When they saw, they bought!

Replaces big crawler

The 24 mph Michigan replaced a 3 yard crawler loader. "The crawler was too slow . . . too often blocking traffic . . . and it couldn't get big enough loads to maintain the desired production pace," according to Supt James Magnotta. Smaller crawlers, attempting to load heavy granite-slab cobblestones, tore out final drives and ended up in the shop. Two big rubber-tire loaders, which had a crack at the job, were sent back to the yard. "They didn't have either the power or the traction needed," said Supt Magnotta.

Does job in 27 days

So the Michigan, working alone, piled and truck-loaded *all the cobblestones.* Over a million of them were handled, according to engineers. Each measured about 8 x 12 inches, weighed about 15 lbs. Individual bucket loads averaged 250 blocks each . . . 3,750 lbs. *The entire job was done in 27 eight-hour days* . . . far faster than other stripping contractors doing the same kind of work with power shovels and crawler-loaders elsewhere along Third Avenue. "Far better too," adds Magnotta. "Our Michigan left the sub-base clean after only one pass. Sensitive controls let the operator

Six-inch concrete slab breaks quickly as Michigan applies its tremendous breakout action. Fast work by the Michigan made job much safer for maintenance of normal highway traffic.

keep just enough down-pressure on the bucket. All we had to do before laying asphalt was fill and level a few spots."

Breaks out concrete

After several days, the Michigan operator became so enthusiastic about the power of his machine, the street foreman tried to tame him down. He gave orders to break out and load some concrete pipe-vault roofs. Even this tough problem had a simple solution. By working bucket edge under the vault and using Michigan's terrific breakout, operator easily broke it loose. Concrete patches and driveway extensions, some 15 to 50 square feet, proved just as easy. "I put in some terrific days—running around the job like a pickup truck," says the operator, Fred Cerbone . . . "did a tremendous amount of work—yet I was *less tired* at the end of a day than on anything else I've operated in my *25 years* with Triboro."

How to cut costs

Triboro's Michigan did more than boost operator satisfaction. It helped cut many dollars of expense from the multi-thousand dollar paving project! As every contractor knows, bidding is extremely competitive on this kind of job; by handling loading and clean-up efficiently, the Michigan kept these expense items from eating profits.

With Clark torque converter, power-shift transmission, power steer, and planetary-wheel axles standard on all models, Michigans deliver more usable power, traction, and speed than any other machines of their type. If you're willing to be convinced Michigan is in a class by itself, do what Triboro did: *ask for a demonstration.* You name the job!

Single Michigan pass leaves sub-base clean, smooth, ready for repaving. Note how unobstructed bucket-arm design preserves dumping clearance.

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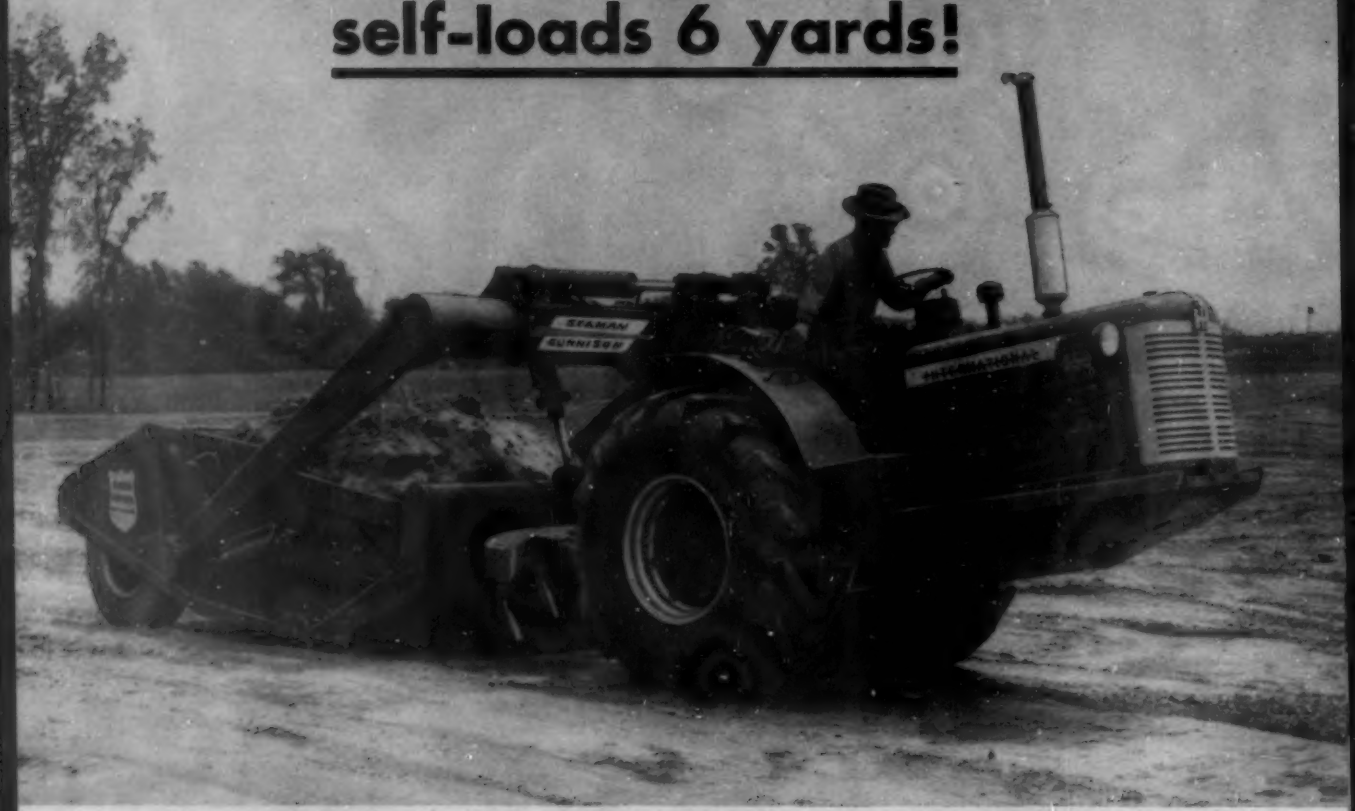
Michigan is a registered trade-mark of

CLARK® EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2497 Pipestone Road
Benton Harbor 44, Michigan
In Canada: Canadian Clark, Ltd.
St. Thomas, Ontario

NEW self-propelled Utility Scraper self-loads 6 yards!



Now you can get a self-propelled scraper sized and priced to help you make a profit on small earthmoving jobs, and cut clean-up costs on big projects

The new Seaman-Gunnison Utility Scraper is *designed* and *priced* for profitable earthmoving where you simply can't afford to tie up a big rig. It's equally a timesaver and cost-cutter for clean-up work on big projects.

You move quickly from yard to site, from job to job . . . *no permits needed!* Simply drive the Seaman-Gunnison Utility Scraper through city traffic or on paved highways under its own power, up to 21 mph. At the job, bite in and heap a self-loaded 6 cu yd. Spread inches-thin or eject the whole load in an instant. If ground is extra hard, lower the built-in scarifier and rip for the next cut!

The new Seaman-Gunnison Utility Scraper for self-loading is powered by an International 650 Diesel tractor, modified as an 88-hp prime mover. At still lower cost, get an International 65 hp W 450 Diesel prime mover, and push-load in difficult soils. All steering and scraper controls are hydraulic. You can turn 180° in 22 ft, 2 inches. Overall width and axle loadings are well within limitations for self-transport and hauling on streets and highways. WRITE, WIRE, or PHONE for descriptive folder and name of your Seaman-Gunnison Construction Equipment Distributor.

Team the Utility Scraper (interchangeable W 450 prime mover) with a Seaman-Gunnison DUO-PACTOR, giving you the *lowest cost system ever devised* for utility earthmoving, compaction, surface rolling, and seal coating!

Utility Scrapers and Duo-Pactors are developments of Harry J. Seaman, pioneer in soil stabilization equipment and techniques for more than 20 years, and are manufactured only by Seaman-Gunnison Corporation.

SEAMAN GUNNISON CORPORATION

- Utility Scraper
- Duo-Pactor
- Duo-Flo Bituminous Distributors

Dept. RS-9, 2763 S. 27th St., Milwaukee 15, Wis.

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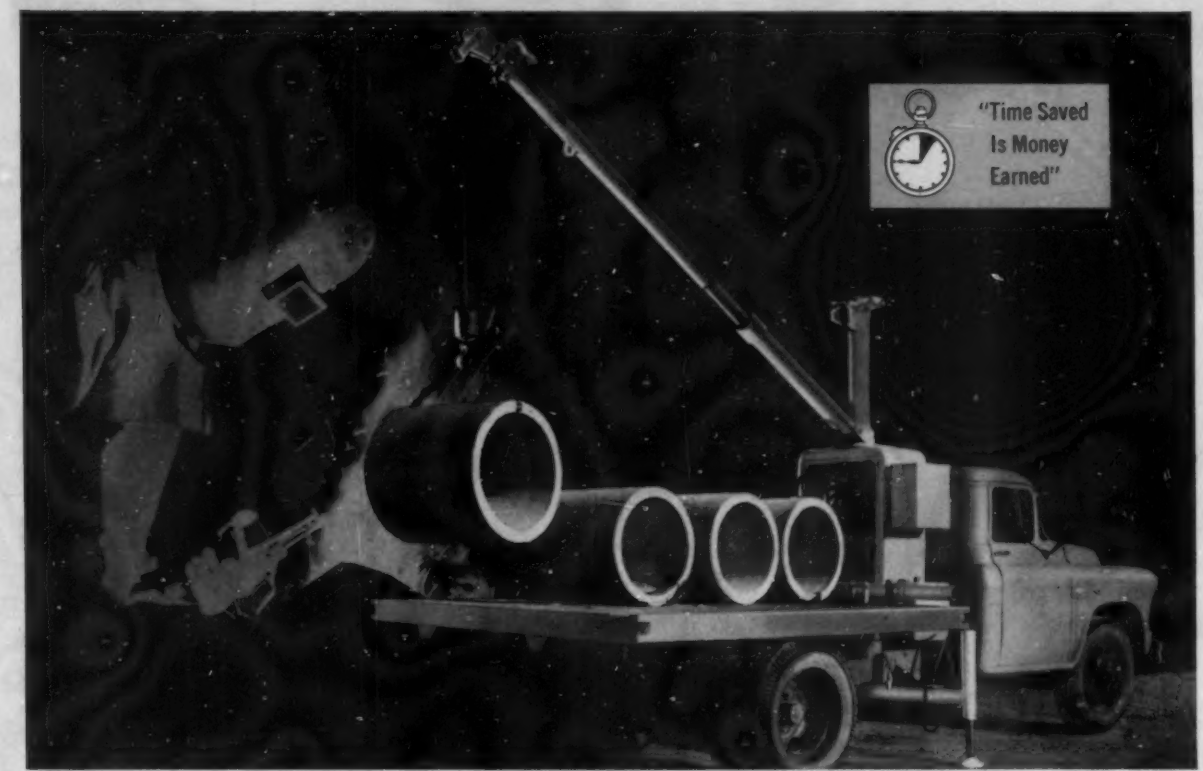
LOOK TO DAYBROOK

...For a New Method of Materials Handling by Truck

...THE POWER LOADER!



Municipal trucks do more work with savings in manpower when equipped with 100% hydraulically operated Daybrook Speedlift Power Loaders.

FOR EXAMPLE—loading, unloading, and distributing supplies and materials for streets, sewers, and line work—erecting poles or moving equipment . . . makes a one-man operation anywhere a truck can go.

With the Daybrook Power Loader, trucks become more than a means of transportation . . . really, a new and proven method of bringing increased efficiency to municipal truck operation.

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☐ POWER LOADER ☐ POWER PACKER ☐ POWER GATE ☐ DUMP BODY—HOIST

Sign below, attach coupon to letterhead and mail in envelope.

Name

DAYBROOK Speedlift® TRUCK EQUIPMENT

DAYBROOK HYDRAULIC DIVISION
L. A. YOUNG SPRING & WIRE CORPORATION
BOWLING GREEN, OHIO

LAYCO

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● **Drilling the biggest rock preparatory to shooting it into removable fragments.**

● **Beginning the clearing of U.S. 52 at a point near Ironton, Ohio, where in April a rock 60 ft. in length slid onto the road, blocking traffic for several hours. (Wide World Photo.)**

How Ohio Crew Cleared Rock Slide

WHAT HAPPENS when a big rock slide blocks a highway? Pictured here is such a slide which occurred in April on U.S. 52 near Ironton, Ohio. It hurt no one but it did take a bite out of the Ohio highway department's district maintenance budget.

According to Arthur H. Peake, division maintenance engineer at Chillicothe, the slide occurred at 11:00 P.M. on April 21. Within two hours a Lawrence county maintenance crew in charge of C. O. Winters, superintendent, was on the scene clearing away trees and flagging traffic. The slide covered the whole pavement and extended about 12 ft. outside the traveled road. Two-way traffic was soon established and maintained except for short periods when material was pushed across the road.

In the slide were two large rocks —one 60 ft. long by 15 ft. high by 12 ft. wide, the other was 30 x 6 x 12 ft. In Peake's own words, "We used 12 men, including flagman day and night; a motor grader, air compressor with jackhammer, flatbed truck, power shovel and two bulldozers (D2 and D8). The cost was $1538.78, which consisted of $807.78 for labor, $547.00 for equipment, $161.10 for aggregate used on temporary run-around and $22.90 for dynamite and caps. The removal was completed at 2:00 P.M. April 27.

"The drilling and blasting operations were slow due to the proximity of houses, making it necessary to shoot small charges of dynamite. The removal of the material was speeded up by obtaining permission to waste on private property across the highway."

Public Told Status of New Highway Location Survey

A careful statement is often issued to the local newspapers when a highway is to be relocated in New York state. The Department of Public Works recently, in such a situation, issued the following statement in connection with a survey of Route 104 in Wayne County, N. Y.

"The survey will study the feasibility of widening the present route as well as the possible need for relocation. Until the survey is completed, it will be impossible for anyone to predict where the highway will be located or the manner in which the improvement will be undertaken. Present concern of local elements that the State has made any decision on this project is without the slightest foundation.

"The survey will take into consideration traffic, terrain, cost and economic factors. Standards must be in accordance with those established by the Federal Bureau of Public Roads. Should it prove necessary to relocate any section of the highway, the new road would be built with control of access. In this way no new businesses could be set up to compete with those already in existence.

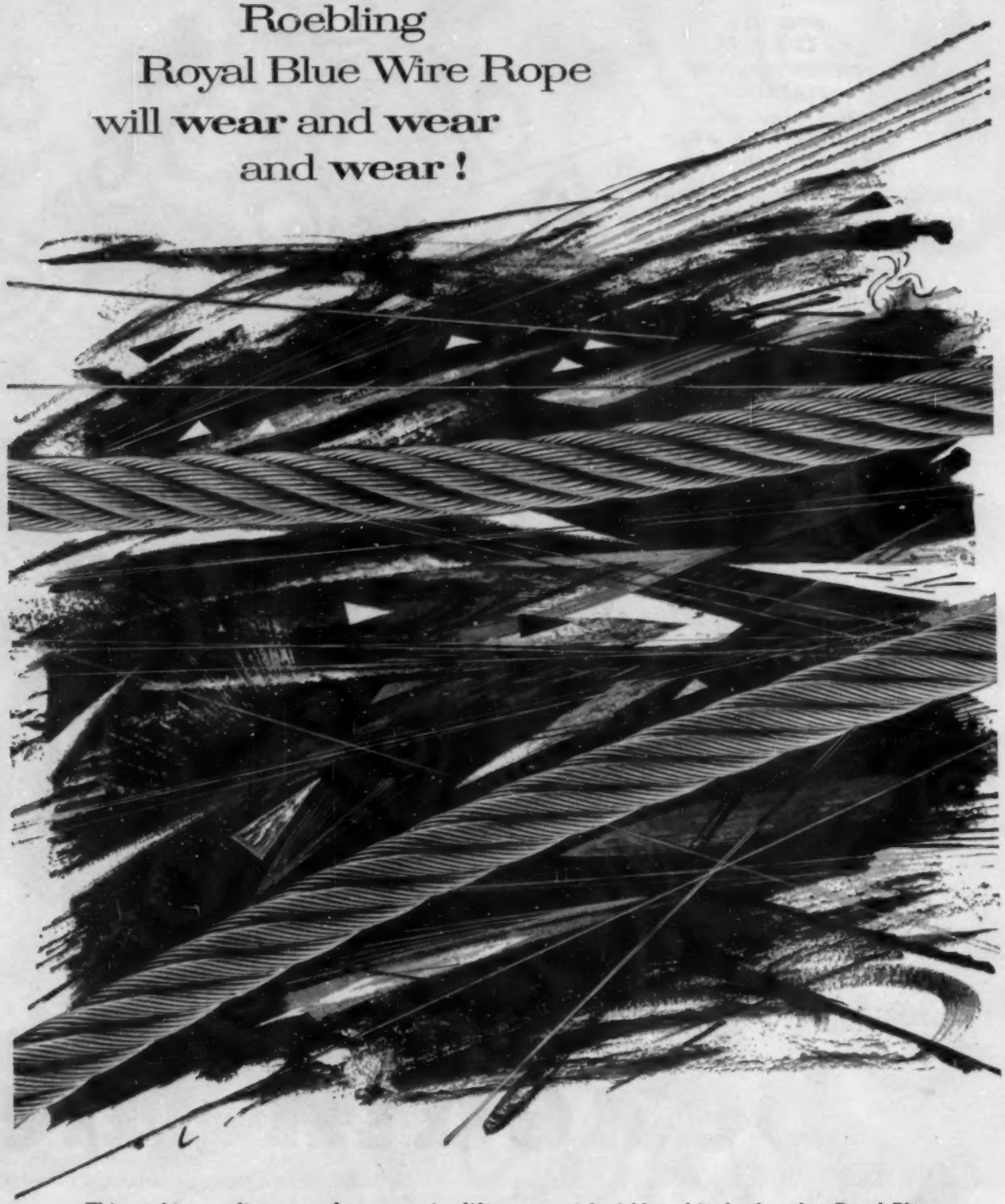
"When this survey has been completed, a hearing will be held at which time the plan will be made public. All interested parties will then have an opportunity to register their opinions concerning the Department's proposal. Speculation at this stage as to the nature of the Route 104 improvement is premature."

Lightning Destroys New Slab

Here's one for the book. Lightning recently ruined 700 feet of newly laid concrete pavement on a road construction job in Elk County, Pennsylvania, according to a report by the state department of highways. During a terrific storm, lightning struck an exposed steel reinforcing bar, raced through connecting bars and oxidized all bars under the section. The concrete pavement, 9 inches thick, was disrupted, 11 holes, each about 2 ft. across, were torn in the pavement.

The highway section involved is U. S. route 219, near Ridgeway. M. and S. Construction Company, Inc., of East Pittsburgh, was rebuilding a 7.08-mile section. Workers had to dig out and reconstruct the damaged stretch.

Roebling Royal Blue Wire Rope will **wear** and **wear** and **wear**!



This working quality means longer service life on *your* job. Add to this the fact that Royal Blue is stronger than the strongest rope you have been using and you have two excellent reasons why it has enjoyed faster acceptance than any wire rope in Roebling's history. Your distributor or Roebling Sales Office will give you the complete story, or contact John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Distributors, Branches and Warehouses Throughout the Country—Subsidiary of The Colorado Fuel and Iron Corporation

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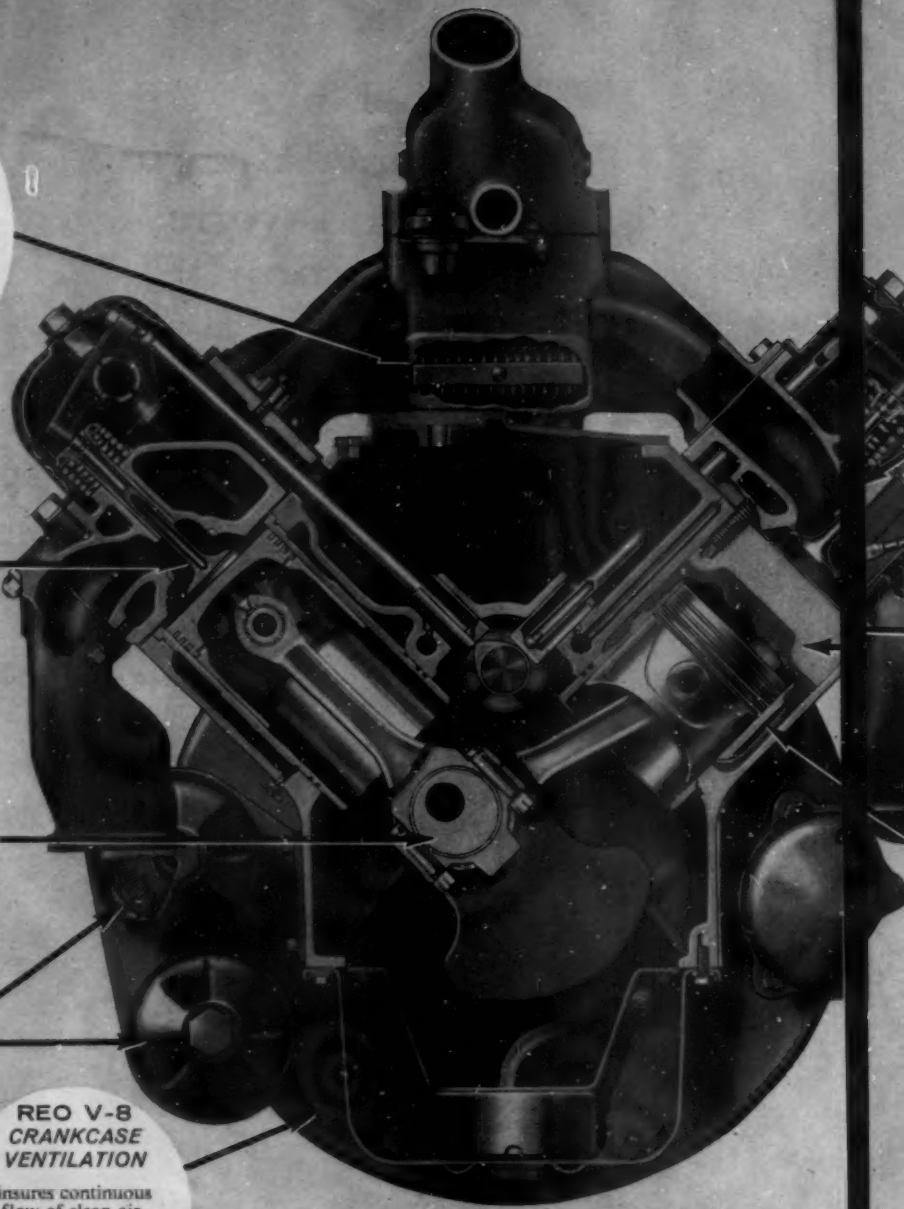


REO V-8
EXCLUSIVE!
OIL TEMPERATURE STABILIZER

holds oil to within 35° above engine coolant. Acts as oil heater for quick warm-ups in winter. Cools oil in summer. This automatic "climate" control means longer oil and bearing life.

REO V-8
EXHAUST VALVES

are sodium filled for quick cooling. Valves and seats are Stellite faced for rugged resistance to scorching heat. Positive rotation insures longer life . . . maximum efficiency.

REO V-8
CRANKSHAFTS

are fully counterbalanced with maximum overlap for rugged strength.

REO V-8
EXCLUSIVE!
DUAL OIL FILTERS

clean all the oil all the time. By-pass and full-flow filtering action means cleaner oil longer . . . less wear, less friction. Reo V-8's have cleanest oil possible in any truck engine.

REO V-8
CRANKCASE VENTILATION

insures continuous flow of clean air. Removes corrosive crankcase vapors . . . minimizes harmful sludge.

beneath the

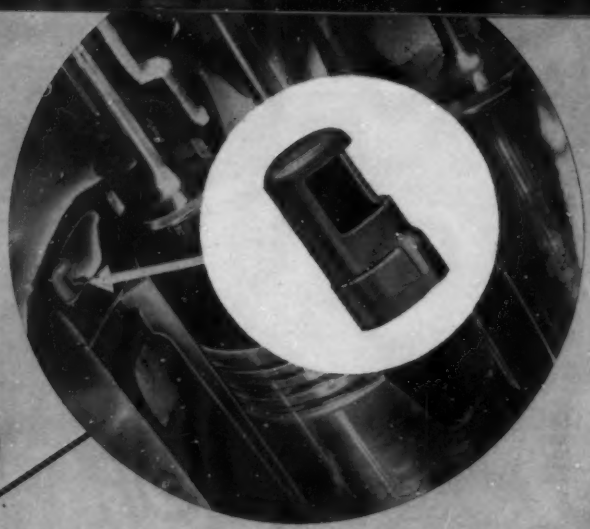
there's a big difference in power!

REO V-8 Gold Comet power on your job adds up to more road power *at the wheels where it pays off.* Lively, economical, efficient power . . . up to 45% more efficient than comparable engines of even greater displacement* . . . and at *governed* engine speeds.

What's more, Reo power has almost unlimited working life. Its "wet-sleeves" make any number of overhauls practical, eliminate re-boring and re-fitting and cut downtime and maintenance cost, in half.

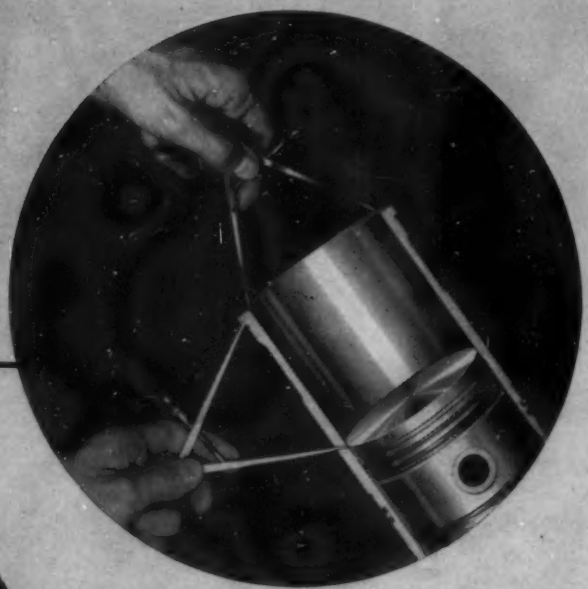
If you're looking for more power for longer life for lower operating costs—be sure a Reo V-8 is "**beneath the bonnet**" when you buy!

*ask us to prove it!



REO V-8 *EXCLUSIVE!*
HIGH VELOCITY COOLING
circulates over 100 gallons coolant per minute (at 3200 rpm) around *full-length* of piston travel. Special jets direct coolant around exhaust valves and spark plugs. No hot spots possible.

REO V-8 *SHORT-STROKE*
cuts piston travel . . . friction . : . power loss. Saves up to 73 miles of piston travel per every 300 road miles (at 50 mph). Reduction of wear and drag means more wheel power.



REO V-8 *EXCLUSIVE!*
REPLACEABLE "WET-SLEEVE" CYLINDERS
precision fitted sleeve-and-piston assemblies install in half the time and cost of re-boring conventional V-8 engines. No re-boring or piston fitting required.

"bonnet"

REO

Gold Comet V-8
207 and 235 h.p. Gas.
(220 h.p. LP-Gas)

Six Cylinder Gold Comets
up to 170 h.p. Gas.
(up to 160 h.p. LP-Gas)

REO DIVISION LANSING 20, MICH.
THE WHITE MOTOR COMPANY

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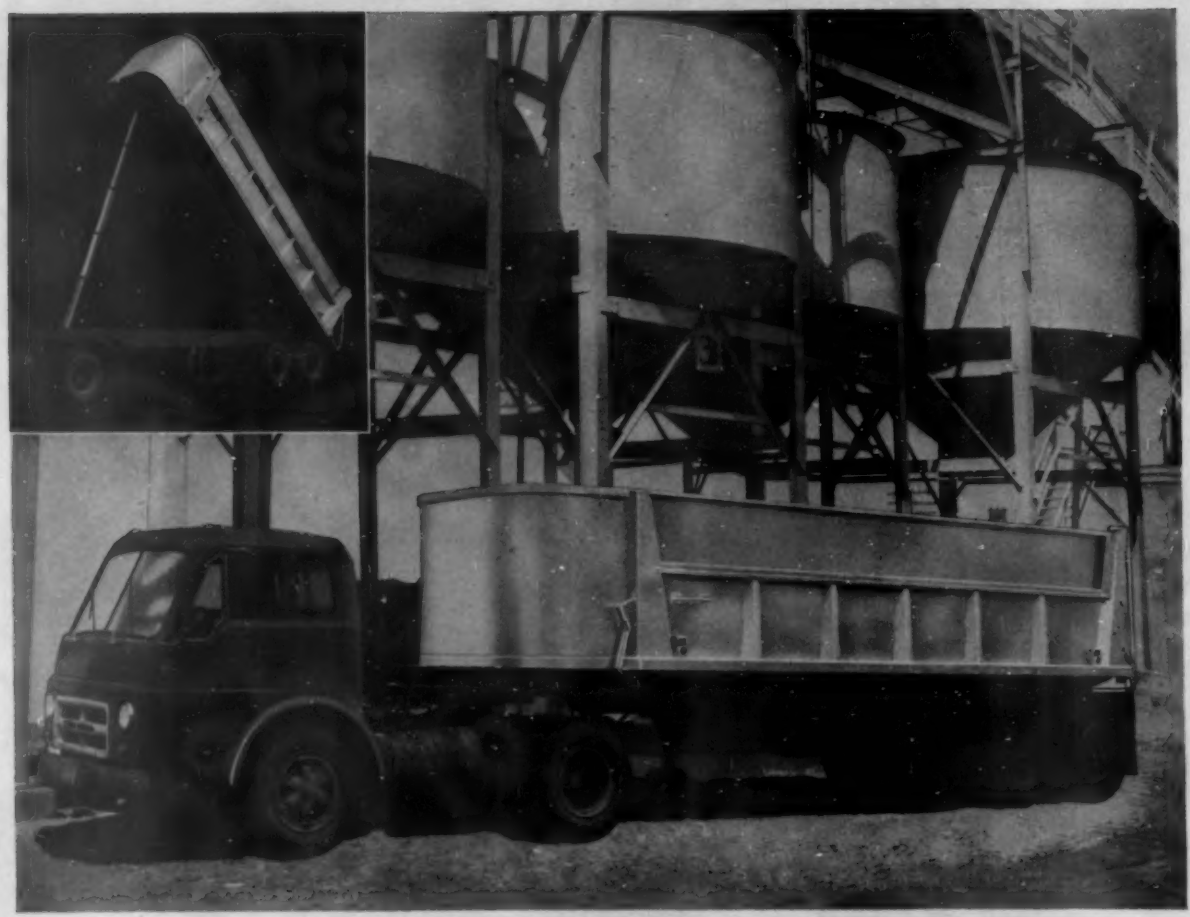

Model STMF, with Uni-scopic hoist and 26 ft., 30 cu. yd. body is ideal for economical bulk hauling. Galion design saves weight . . . hoist, body and chassis form closed triangle for maximum stability when dumping.

GALION TRAILER DUMPS

haul more . . . earn more with every load!

There's a model in Galion's trailer dump line *exactly* suited to your loads and the axle weight limitations in your locality. You'll find that you can select a Galion trailer dump custom-engineered for ideal weight distribution on *your* job . . . one that will enable you to haul extra profit-making payloads *legally*.

And, Galions are safer, too! They provide unexcelled stability, both on the highway and when dumping. All wheels remain on the ground as the body raises . . . stresses are evenly distributed throughout the running gear. What's more, Galion's lightweight yet rigid body-hoist-chassis combination eliminates twisting — a common cause of dumping upsets!

Your Galion distributor offers a full choice of trailer dump body, hoist, chassis and running gear types and capacities. Ask him to show you how you can haul more . . . earn more with Galions.

AA-5488

MODEL SSM — Best where local weight laws allow high individual axle weight limits, but relatively low gross weight limit.

MODEL STM — For use where weight laws allow credit for only one set of tandem axles, with medium gross weight limit.

MODEL TTM — Used in those areas where highway weight limit laws allow maximum credit for two sets of tandem axles.

MODEL HH — Ideal where laws permit "trains" and require maximum axle spacing for greatest gross weight allowance.

UNI-SCOPIC

more payload . . . more profits with Galion!

GALION ALLSTEEL BODY COMPANY • **GALION, OHIO**

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Bituminous ROADS AND STREETS

Published by Simmons-Boardman Publishing Corporation
34 North Dearborn Street, Chicago 10, Illinois

Heavy-duty asphaltic concrete being placed for a new four-lane divided segment of U.S. 81, Comal County, Texas. Dean Word Company, contractor. (Caterpillar Tractor Co. photo)

SEPTEMBER 1957

Two New High-Capacity Asphalt Plants Announced by Barber-Greene

These two new continuous asphalt plants give greater versatility than ever before available. The same mixer, without alteration, may be used with any combination of plant components to produce all types of mixes—from the simplest cold mixes to the highest types which must meet the most rigid specifications. Model 847 is for high capacity. Model 848-A is for extra high capacity.

It is only necessary to transport and operate the components required for the job:

For cold mixes: Mixer + calibrated feeder

For intermediate hot mixes: Mixer + calibrated feeder + dryer

For high-type mixes: Mixer + gradation unit + dryer

Plant with four-bin gradation unit for production of highest type mixes. This multiple-aggregate plant is available in both sizes.

Cold-mix plant, available in both sizes, consists of mixer and calibrated feeder. Dryer and gradation unit may be added later.

Both models offer these advantages:

- Unequaled versatility as described above.
- New hydraulic clamshell discharge gate saves truck time, prevents segregation.
- Transfer pump assures constant head of asphalt for metering pump, eliminates need for asphalt storage tank on mixer.
- Interlocked aggregate and asphalt feeds assure constant, correct proportioning.
- Truck pit no longer required.
- Highly portable plant components allow fast travel between jobs, pay off in more days of operation per season.
- Erection is merely a matter of spotting the units at the plant site and dropping the jacklegs.
- New, easier calibration of single-aggregate and cold-mix plants.

57-12-A

Write for information on these two new flexible high-capacity asphalt plants.

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

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No "Cure-All," but...

Salinas, California, finds a single grade of Bitumuls® solves five paving maintenance problems

HERE'S A SITUATION common to most growing cities: annexation of outlying residential developments has vastly expanded the street maintenance job *without* materially increasing available funds. Annexation has not only added to the street mileage, but has "contributed" many sub-standard pavements to the street system, thus adding to the complexity of the job.

In an effort to solve this problem, these three Salinas men most directly concerned have worked together: Thomas A. Dunne, Director of Public Service; his assistant, Al Rossi; and Harry Adams, Maintenance Supt. Their search for simplicity and standardization led them to look for a versatile asphalt material that would do many jobs. They found it in Bitumuls SS-1, an asphalt emulsion that can be handled and used without heating, in small quantities or large.

Now, stored in a single 25,000-gallon tank, Bitumuls SS-1 is used for: Patching, Tack Coats, Prime, Seal Coats & Surface Treatments, and for Base Stabilization. In addition, Salinas City Forces can also use this same grade of Bitumuls for the new Slurry Sealing; and—at high dilution—for dust-laying on unpaved, outlying roads. All of these jobs can be done with existing equipment: a grader, a "Pulvimixer", a water wagon, two distributors, and a roller.

The obvious economies resulting from the use of this one material for all these jobs merit investigation by paving maintenance men everywhere, regardless of the size of their community.

There's a Bitumuls man near you who can supply details. *Call him, today, or write:* **American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 20, Calif.**

(Top), "PULVIMIXER" reworks old pavement that has been scarified and bladed in restabilization operation. Distributor applies Bitumuls at ¾ gal./sq. yd. per inch of depth. (Center), DISTRIBUTOR applies prime on a waterbound base, using Bitumuls SS-1 diluted (2 parts SS-1 to 1 part water) at 0.3 gal./sq. yd. of dilution. (Bottom), HERE'S A CLOSE-UP of the finished texture of a Bitumuls SS-1 Seal Coat pavement.

(Right), SALES ENGINEER Bob Ridell, far left, of American Bitumuls & Asphalt Co., discusses plans with Tom Dunne, Director of Public Service for Salinas, and his assistants. At far right is a partial view of the 25,000 gal. storage tank. (Below), EVEN SCHOOL YARDS are given stabilized bases with Bitumuls SS-1.

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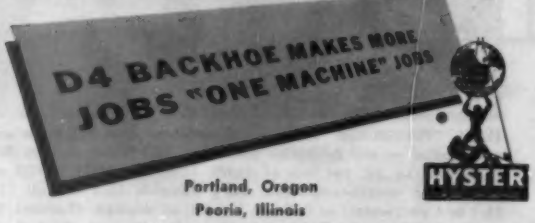
Close Quarters Can't Confine...
the HYSTER D4 HYDRAULIC BACKHOE

HYSTER COMPANY



Portland, Oregon
Peoria, Illinois
Nijmegen, The Netherlands

- **Simultaneous hoist-and-swing.**
- **Full digging power anywhere within the 240° swing arc.**
- **Unobstructed operator visibility.**

These PERFORMANCE FEATURES make this job "routine" for the backhoe in spite of obstacles restricting operating space at this crowded industrial site.

Match these **ADDITIONAL PERFORMANCE FEATURES** to your own job requirements, and you will understand why more and more contractors are making use of the dependable, low-cost power of the D4 Backhoe to cut operating costs and step up production.

	On D4 Tractor	On 955 Traxcavator	On HT4 Traxcavator
Maximum Reach From Tractor Rear Sprocket	20'4"	20'9"	20'11"
Maximum Digging Depth	13'	12'3"	12'9"
Clearance at Beginning of Dump	9'7"	10'3"	9'9"
Clearance at End of Dump	14'9"	15'5"	14'11"
Dipper Wrist Action	104°	104°	104°

4 Tons of Tooth Force • Track-type Tractor Mobility
Combination Hoe and Heavy-duty Bulldozer

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VIEWS AND COMMENTS

. . . By H. G. Nevitt

What Do We Really Need to Know About Mixes?

In the May issue Mr. Chastain presented an excellent summary of the comparative situation in bituminous concrete practices. The state of affairs brought out by the presentation could very well leave the average highway engineer in complete confusion. Not only are a number of radically different design techniques (including no technique) in use, but the number of tests applied to the finished mix and pavement are considerable, running from "stability" tests of various kinds to such items as density, voids, percent of voids filled with asphalt and so on. Presumably all of these are supposed to lead to the same result from any particular group of materials; namely, the construction of the optimum pavement.

To mention only two, some fair questions are:

1. Why, if a certain test is needed in one approach to get this result, isn't it required in all others?
2. Since many of the tests obviously do not constitute a different approach to the same information, are they really necessary?

We think a common-sense analysis will at least indicate the answers to these questions.

A pavement is a structure. It must function both as a wearing course and as a part of the over-all load bearing mechanism. Assuming that materials suitable from other standpoints (such as ability to maintain their functional characteristics) are used, it will be satisfactory if it carries its load under all possible critical conditions which may be encountered. These critical conditions are four in number, as follows:

Pavement Failures

First, the pavement must not fail when turned over to traffic at the completion of the construction. Since the conditions at this time will almost certainly be favorable to the over-all structure, such failure is only likely to occur in the pavement proper. Consolidation and densification of the pavement and the structure below it will not constitute failure unless the amount of such consolidation is sufficiently large to permanently displace the pavement surface, ending up in roughness or an undesirable appearance. Generally speaking this is not likely to occur except with channelized traffic, and this point must then be given attention. However, in the usual case failure at this first critical condition will only occur when the pavement flows as well as consolidates under load.

Critical Conditions

The second critical condition occurs when the recently consolidated pavement must carry the load despite minimum load bearing conditions or support from the subgrade. Ordinarily this will occur in the spring breakup period following construction. At this time the structure as a whole will have minimum strength; it is essential that the pavement consolidate to the extent needed by this time, imparting sufficient strength to the over-all structure to carry out its part of this function.

The third critical period will occur at the end of the useful life of the pavement, when under the influence of traffic over many years consolidation will have progressed to the maximum. Such consolidation must not have reached the point where reduction in stability has occurred. This will of course correspond to over-filling the voids in the pavement. In brief, we can say that the pavement must consolidate sufficiently to develop the desired strength, yet not carry this consolidation to a point that failure occurs under the anticipated load due to void overfilling previous to the end of the contemplated service period.

There is finally a fourth critical situation which may occur any time during the life of the pavement, but which is normally most serious at the start of the pavement life when minimum consolidation is present. This critical condition results from maximum exposure to moisture, either from the surface, from below, or in combination. If the pavement characteristics are such that this water will produce instability, such as through stripping effects on the asphaltic films, it will result in failure of the pavement. In brief, the pavement even at the start of its existence must show sufficient resistance to water infiltration and to water action on its films to assure that failure will not occur during the period of such exposure. This exposure in most cases is not lengthy, but varies from project to project; probable exposure time is a definite factor in considering this fourth critical situation.

It will be noted that all four critical conditions are basically structural; the suitability of the pavement to resist them should therefore need only testing through a structural approach. Essentially such approach would logically be as follows. For each condition a sample of the pavement would be produced in such fashion as to completely simulate the internal pavement structure. This means that in such matters as particle arrangement, film characteristics and consolidation the sample must be identical with the actual pavement at the time it will be subjected to the critical situation under discussion. Such a sample should then be subjected to the stress provided by the pavement conditions, so that its resistance to these pavement conditions can be determined.

Stability Tests

In brief, both the pavement conditions or environment and the pavement stresses must be exactly duplicated. Since there are four critical conditions, tests on four

samples (actually, sets of samples) corresponding to these conditions in both the preparation and in the testing would be sufficient to determine the suitability of the proposed mix for its intended function. Incidentally it should be noted that this testing must reveal not merely the ability of the pavement to function as an individual unit but also its ability to properly perform its portion of the total load bearing function —a point still ignored.

If four such stability tests on four samples properly prepared and subjected to the critical environment are all that is necessary, what use is there for the numerous tests mentioned previously and in actual use? Why do we need density, void content, or similar? Above all, why should we be confronted with the present extensive disagreement on how to obtain these figures if they do not have any direct bearing on the suitability of the structure to meet its functional requirements?

Two Requirements

Strictly and from a theoretical standpoint only, we do not need these further tests. If the proposed design meets the standards called for by these structural tests it could be accepted: if it does not, it certainly should be rejected. However in practice some of these additional tests are worthwhile. They are helpful in two ways. The first is that they may facilitate our attainment of the optimum mixture from the structural standpoint. The second is that they may indicate the factor of safety, warning us as to how much protection our design has against the variations to be anticipated in the actual construction. These matters will be discussed in next month's issue.

Summing up, it is clear that to judge the adequacy of a pavement for its intended use as a highway structure two things are required. The first is evaluation of the pavement from a use basis: the critical conditions which might cause failure in the structure must be anticipated, and the testing tied to them. The second requirement is tests which measure the pavement's ability to function, and this implies structural tests. Any others must be correlated to the pavement functions, and their use must be justified. These statements are logical, but actual highway practices often fail to meet the requirements listed. The cheapest, most effective highway will not result unless the engineering is sound.

Dr. Hoiberg to Flintkote

Dr. Arnold J. Hoiberg

Dr. Arnold J. Hoiberg has been appointed assistant research director of The Flintkote Company, maker of a wide range of construction and industry product. Dr. Hoiberg, well-known authority on asphalt technology, previously was asphalt research director for the Lion Oil Company in El Dorado, Ark. He has many publications and patents in his name and is a past-president of the Association of Asphalt Paving Technologists. He will make his headquarters at the Flintkote research laboratory in Whippany, N.J., where he will serve as assistant to R. H. Cubberley, research director.

Open New Bitumuls Terminal

A new asphalt terminal has been opened at Marietta, Ohio, by the American Bitumuls & Asphalt Co. to serve southeastern Ohio and the western part of West Virginia. The terminal is designed to handle the storage and processing of all standard grades of asphaltic products used by the paving industry for roads, streets and airports.

Asphaltic products furnished from the terminal will be manufactured at the company's Cincinnati refinery and transported to Marietta by river barge and rail. The modern tank-truck shipping installation includes special loading facilities to permit area delivery of asphalt at application temperatures.

E. L. Rothermund is resident manager of the new American Bitumuls and Asphalt terminal. Harold Eastwood will serve as sales engineer for the terminal in the West Virginia area.

● Toll revenues for the New York Thruway are up 19.4% for the first half of 1957, compared to the first half of the previous year. Toll revenues for the period totalled $10,330,000. Revenue from gas stations, restaurants and other concessions along the thruway are up 66.8% compared with the 1956 first half (tolls collected at the Tappan Zee bridge are up 50%). Thruway gross income is running at the rate of $25,000,000 per year.

New International 6-Wheel Off-Highway Truck

International 6-cylinder model RF-204, one of two new "tax-free-type" 6 wheel units added to the large off-highway line of International motor trucks. Both it and the V-8 powered VF-204 have gross vehicle weight ratings of 41,000 lb. and gross combination weight ratings of 65,000 lbs. Optional tire sizes are available, as are 6 and 8 cylinder LPG fuel systems, factory installed. Federal excise tax does not apply to the sale of either model, according to the Internal Revenue service following examination of the units' specifications.

FINGER-TIP CONTROL and ECONOMY OF OPERATION

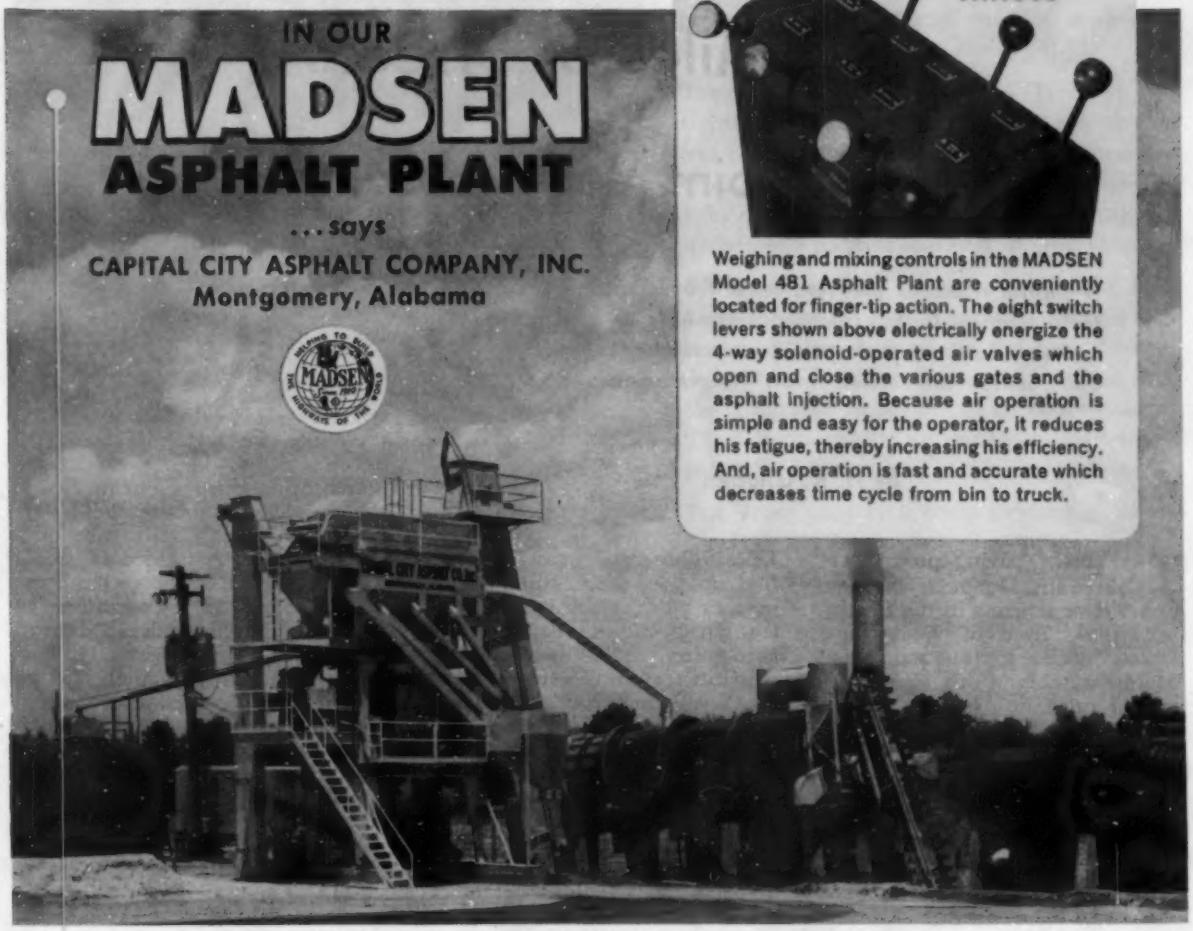
ARE "*STAND-OUT*" FEATURES

IN OUR

MADSEN ASPHALT PLANT

...says

CAPITAL CITY ASPHALT COMPANY, INC.
Montgomery, Alabama



Weighing and mixing controls in the MADSEN Model 481 Asphalt Plant are conveniently located for finger-tip action. The eight switch levers shown above electrically energize the 4-way solenoid-operated air valves which open and close the various gates and the asphalt injection. Because air operation is simple and easy for the operator, it reduces his fatigue, thereby increasing his efficiency. And, air operation is fast and accurate which decreases time cycle from bin to truck.

▷ Owners of MADSEN Model 481 Asphalt Plants are quick to praise the fast-action, finger-tip control of the weighing and mixing operations. Capital City Asphalt Company, Inc. of Montgomery, Alabama, who own and operate the 4000-lb. MADSEN Model 481 Asphalt Plant shown above, rate this MADSEN advantage a most important factor in obtaining maximum daily production. After completing a contract calling for 25,000 tons of hot mix for city streets, this well-known contractor says *"our MADSEN Model 481 gives us a very good volume of production with a minimum of operating costs."*

The MADSEN Model 481 Asphalt Plant is big, oversize throughout with larger elevator, screen, bins, weighbox, mixer and drives. The 6000-lb. plant can easily handle 180 T.P.H. on a one-minute mixing cycle, with user claims nearing the 300 T.P.H. mark. The Model 481 is available in 4000-lb., 5000-lb. and 6000-lb. batch capacities. (If purchased as a 4000-lb. plant the Model 481 may be converted to a 5000-lb. or 6000-lb. plant with only minor modification costs.)

Combine the big MADSEN advantages of easier operation, greater economy of operation, bigger day-in and day-out production with long-range, in-built MADSEN versatility, and you can see why more and more successful asphalt producers are buying MADSEN. Why not get the complete MADSEN story today.

Equipment that Serves

Ask your MADSEN Distributor for Catalog No. 800 or write MADSEN Works. Baldwin-Lima-Hamilton Corporation P.O. Box 38, La Mirada, California.

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Is This Still a Record?

75 Miles of Streets

In One Joint Venture Contract

A public relations program backed by a sincere effort to minimize traffic interruptions, hazards and dust nuisance has been part of the contractors' effort at Great Falls, where the "whole town" is getting new streets.

Part II

By H. K. Glidden

THE STREET paving program at Great Falls, Montana, first came under close scrutiny in the December, 1956, issue of *Roads and Streets*. Refer to this article for details as to how this $5 million project came into being, and the unique manner in which three contractors joined together to form the construction firm, City Constructors. They divided this project into three areas and drew lots to see which of the three firms, each as a subcontractor, would perform the preliminary work in a given area. The work was further subcontracted until it ultimately involved a good many more contractors.

The 1956 article was based on the status of this project as of the time it was first visited in August, 1956. The scope of the work at that time was largely preparatory, involving the removal of old curb and gutter, the installation of new curb gutter, and the modernization of utilities, storm sewers, and other structures which would be difficult to get at after the new pavement was in place. The year 1956 saw considerable excavation of old pavement and preparation of base course for the new pavement. In fact when construction ceased in 1956 some 126 blocks had been paved, with 112 additional blocks of sandstone base course in place. A large amount of hot-mix aggregate had been crushed and stockpiled and two hot-mix plants erected. Hence a running start was made in 1957.

While some new equipment had been added to the project, particularly for the purpose of compacting the sandstone subbase, there were few changes in construction procedures from those used in 1956.

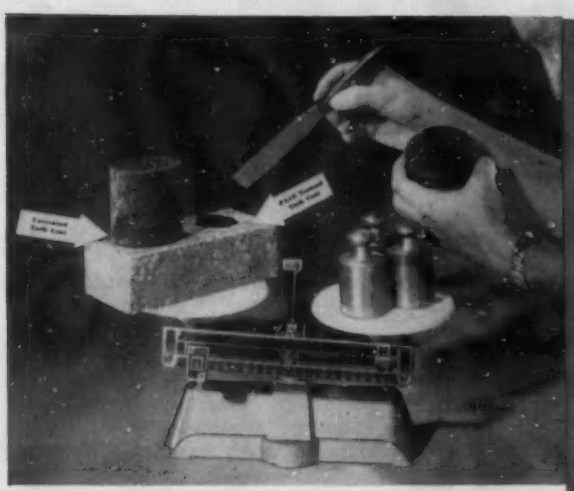
Hoskins & Associates, consulting engineers, found it expeditious to revise the pavement design so as to use a standard section for all streets; this against the original idea of varying subbase thickness according to the type of soil encountered. The 1957 practice was to resort more to removal of all unstable material and replace it with granular material.

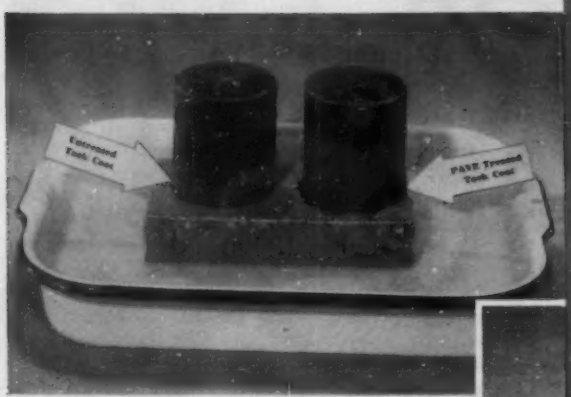
Late June of 1957 saw operations either on schedule or considerably ahead. The consensus was that the project would be finished somewhat ahead of the October 1 date originally anticipated. Being on schedule was credited to excellent planning and construction management

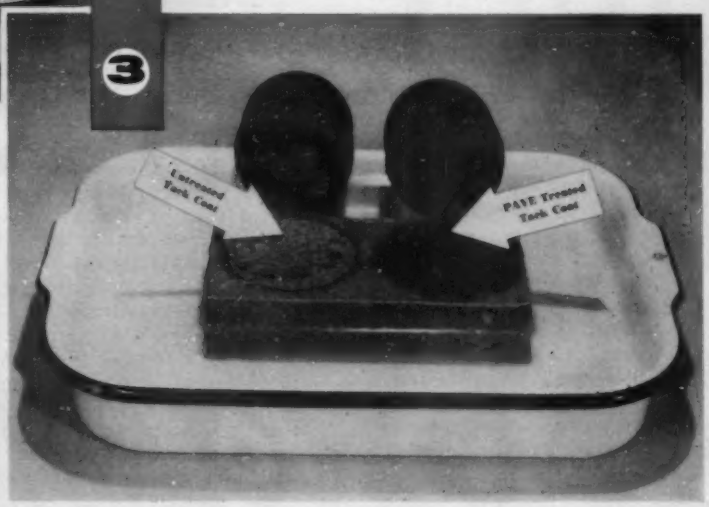
(Continued on page 150)

Some of the Pavers **Four Barber-Greene finishers, two shown here, made short work of block-by-block paving. Galion Roll-O-Matic, loaded to 12 tons, does breakdown rolling behind paver.**

Put more tack in TACK COATS!







Strengthen tack coat bonding and holding power for any road surface. Stop tack coat stripping.

Tack coats treated with PAVE-bond and tightly hold asphalt overlays to any dry or wet road surface—including such strippers as brick and portland concrete. The stronger PAVE bond prevents tack coat stripping and maintains a positive seal against ground water.

Give new asphalt overlays protection from early failure by PAVE treating asphalt cutbacks and emulsions used for tack coating. Just blend PAVE into your cutback or into the liquid asphalt before making your emulsion. Then, apply the PAVE treated asphalt to the road and benefit from a superior tack coat.

Put down your tack coats for long service—use PAVE!

For more information on increasing asphalt coating and bonding, write for PAVE literature.

Destructive action of surface and underground water on tack coats—and how this is prevented with PAVE—is shown by the simple demonstration pictured on this page. The demonstration is conducted as follows:

1. **Put a 1/16 inch film on RC-2 tack coat in a circular pattern on the left side of a water-saturated portland concrete brick. Put an equal amount of RC-2 tack coat treated with ½% PAVE on the right side of the same brick. Identical cylindrical asphalt concrete bricks are hand pressed to each tack coated area.**

2. **The tack coated portland concrete brick with the asphalt overlays is placed in a pan of tap water, in which the water level is maintained just below the top surface of the portland concrete brick. Capillary action draws moisture up to the tack coats.**

3. **After ten days inspect both tack coats. The asphalt concrete brick over the untreated tack coat lifts easily because the untreated tack coat is not bonded to the portland concrete base. Photo shows there is no bond to the base. The asphalt concrete brick over the PAVE treated tack coat must be pulled away from the base, since the PAVE treated tack coat bonded both to the asphalt concrete overlay and to the wet portland concrete base. Photo shows the PAVE treated cutback firmly bonded to the wet portland cement.**

PAVE HEAT-STABLE

Carlisle Chemical Works, Inc.

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Disposing of Old Subgrade

Caterpillar No. 977 Traxcavator loaded trucks and then spread waste excavation in disposal area. (Below): Nilson-Smith used Cat 12 motor patrol for windrowing excavation for Cat 428 scraper pulled by DW15 tractor with D8 pusher.

75 MILES OF STREETS

(Continued from page 148)

as the spring of 1957 was one of the wettest in years and a cause of delay of activities into mid-season. Nevertheless, the work was 67 per cent completed as of July 1.

At the time the job was visited in 1956, the project had been in progress only a short time and there had been little opportunity for the residents to get over the initial shock of having the entire city pavement torn up at one time. By 1957 they had gone through a winter and had experienced discomforts in getting around. It was remarkable to find that there had been few complaints, these mostly from the "chronic complainer" type of citizen.

In planning for this extensive project, the Great Falls project planners took into account both the safety and convenience of the citizens to the fullest extent possible. The measures in effect to provide for either safety or convenience were the following:

1. Streets were torn up and paving priorities given according to a definite pattern which had the approval of the fire department.

2. The fire department must have access to every structure in the city. In the badly torn up areas most of this access was through the alleys.

3. City Constructors was required to report daily to the fire department the streets which were closed and passable, and the streets which were closed and impassable. The fire department kept a chart, actually a map of the city gridded by numbers, so that any particular address could be spotted immediately and a proper routing given to the fire department.

4. Specifications required that each citizen be able to get by automobile to at least within one block of his residence at all times. Again, this took into account the fact that access in many cases had to be through the alley.

Bus Lines Open

5. The tearing up and paving operations were designed to keep the bus lines open. It was often necessary to reroute the buses from street to street, but as of this summer there had been only two complaints from the bus company.

Experience in Great Falls has shown that, in general, the townspeople will be extremely patient as long as there is continued activity on the part of the contractor. It developed that they hate to see a street torn up and left that way for any length of time without anything happening. Complaints were kept down when activity was continuous. It proved to be possible for the street system to become a nightmarish maze of twists and turns, many resulting in dead ends requiring several new approaches in an attempt to get across town. It was easy to see that it would be impossible to anticipate even a majority of the difficulties which were actually encountered.

City Constructors was quick to realize that their interests would be enhanced if they could experience good public relations with the citizens of Great Falls. They have carried on an active publicity campaign with the aim to keeping the public informed of their plans and activities. As an example, they sponsored the rededication program of Gore Field on a local radio station. They used their commercial time to plug safety on the city project. They pointed out the dangers which existed where children were allowed to play recklessly around open excavations or lighted flares. The whole-hearted support of the editor of a local paper helped greatly. This active program has been credited with keeping traffic and other accidents to a minimum.

One of the initial construction activities was a modernization of existing storm sewer system and such extension as was necessary. The storm sewer cost averaged about $7,000 per block with pipe ranging in size from 15 to 54 in. The removal of surface water is based on maximum overland flow of three blocks. It actually averages about two blocks.

The trucks and vehicles used by supervisory personnel of both City Constructors and the engineers were equipped with two-way radio. Hoskins' office as well as the construction office had a radio network, each with its own frequency.

Bud Nesbitt reported that City Constructors experienced a surprisingly small number of job headaches in relation to those which might have been expected. It is customary for property owners here to irrigate their lawns constantly in order to keep them from dying out in the summertime. Principal headache was the over-irrigation of lawns. The excess water ran mostly onto the subgrade, with soft spots resulting. The people were requested to refrain from excessive watering of lawns through both radio and newspaper publicity.

● 3,500-gal. water tank on International S-180 truck—part of high-volume moisture application to maintain optimum moisture in sandstone base course.

Trench Needed

The pavement required a trench excavation of 12 in. below the gutter flow line for residential streets and 16 in. for arterial streets. This required the removal of the existing pavement as well as a considerable depth of earth below the pavement. For the most part, conventional grading equipment, such as is shown in the accompanying pictures, was used by the three principal contractors in their excavation activities. In the S. Birch, Inc., area, it was interesting to watch a Cat D8 pusher loading a Cat 428 scraper. About half of the time the pusher operated in a conventional manner pushing this scraper. The other half of the time the scraper was loaded by being pulled with a heavy cable by the pushing tractor. On a return trip, after having pulled the scraper, the pusher used scarifier teeth on the bottom of the pusher pad to scarify the existing pavement ahead of the scraper. In this manner it was possible to use the pusher effectively both coming and going. A Cat 977 Traxcavator proved versatile in loading excavation onto trucks as well as leveling the excess excavation in disposal areas.

City Constructors opened up a sand and gravel pit adjacent to the south city limits of Great Falls to produce subbase material. The granular strata ran from 7 to 7½ ft. deep over a wide area. However the pit was located in a section which could eventually become valuable residential property. In order to keep from rendering this property worthless, the contractor wasted sufficient of the pavement excavation in this area so as to bring the level of the ground back to approximately that which existed prior to opening the pit. The truck loading arrangement, which utilized two bulldozers and a Kolman loader with screen, is clearly illustrated in the accompanying photograph. City Constructors found a U-dozer to be most effective in pushing material up to a close proximity to the hopper. It then proved best to use a straight dozer to actually push the material from there into the hopper. The loader was moved from one place in the pit to another in approximately 1½ hours.

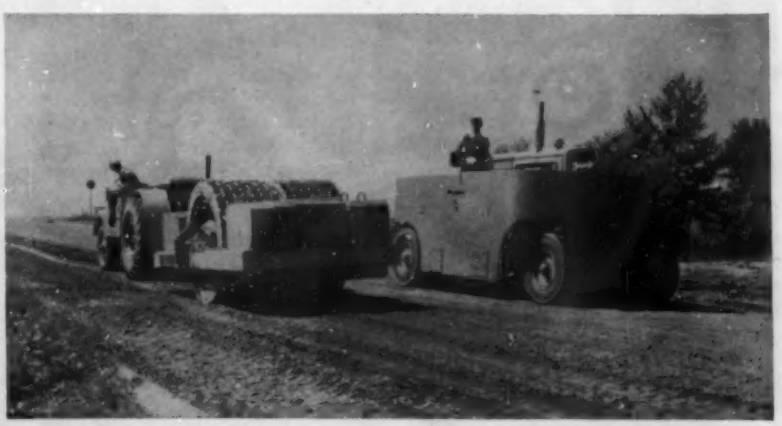
Base course material was produced from a sandstone quarry in which subcontractor Nilson-Smith has a permanent crusher set-up. An all-electric Universal crusher produced 300 tons per hour on an average.

A sandstone quarry, adjacent to the crusher, produces a very hard dense rock which has been found to be satisfactory for base course on the two large airports close to Great Falls as well as on highways and city paving.

Sources of aggregate suitable for hot-mix asphaltic concrete occur only in rather limited pockets within a reasonable distance of the project. It proved necessary for City Constructors to move this aggregate crusher from one location to another. Hot-mix aggregate production was based on having a large stockpile of aggregate available at the plant at all times. This stockpile was increased at every convenient opportunity, often using trucks when they would otherwise be idle. In addition to their own trucks, the contractors hired many local trucks to haul in aggregate to the stockpile.

Keeping Dust Away

Hot-mix asphaltic concrete was produced just south of Great Falls in an area where the dust didn't create a nuisance. In order to provide adequate capacity to take care of the four Barber-Greene spreaders used in placing the hot mix, it was necessary to install two hot-mix plants at the aggregate stockpile.



Rolling Combination S. Birch, Inc., found combination of rollers effective—Hyster grid roller pulled by Cat DW10 tractor, and Ferguson model 2511 loaded to full 25-ton capacity. This team secured high specified density for sandstone base course.

Two Hot-Mix Plants

Cedarapids 4,000-lb. batch plant was on north end. (Below): Pioneer 101 plant located on south end. Together, they furnished 300 tons per hour for four pavers.

A Pioneer 101 and a Cedarapids 4,000-lb. batch plant together furnished 300 tons per hour.

Ordinarily the same Ford Big Job trucks hauled both subbase and base course aggregates. In both instances the length of windrow was governed by the weight of the aggregate in the particular truck. The contractor's man was given a list of spread distance for various load weights. Distance was marked on the ground. This method and constant thickness weight measurements produced quite accurate windrow distribution.

Subbase was spread to a compacted depth of 4½ to 5 in. in one lift; base course to 5 in. on one lift or 8 in. in two lifts on arterials.

Hoskins used old railroad spikes as stakes for blue tops on the finishing of the base course. Spikes were furnished by City Constructors. Hoskins uses self-leveling instruments and likes them.

The asphaltic hot mix was hauled partly in hired trucks. In regard to such trucks, the contractors found that the truck owners were reluctant to haul at or below the legal weight limit if they could possibly get out of it. In some instances, City Constructors built their own haul roads to avoid having to haul on either state or city pavement subject to weight restrictions. For some time this was feasible, in that all of the hauling was either done on their own haul road or in the construction area except for the crossing of the state highway. Subsequently, a very strict in-

Sand for Subgrade **Two Cat D8 dozers, U-dozer pushing and straight dozer feeding, strip 7 ft of sand subbase to feed Kolman loader to heap 13-yd. loads on Ford Big Job T-750 trucks.**

Getting Storm Water Out of Excavations

● Worthington Blue Brute 20M centrifugal pump in Ford pickup pumped storm water into 3,500 gal. water tank.

● Rex centrifugal pump on Chevrolet pick-up pumped sludge from intersection after other trucks removed deep water.

● All three companies took quick measures to hasten drying of subgrade by removing storm water from pavement trench excavation. S. Birch, Inc., used a Gorman-Rupp model 3D 8 R6 piston pump.

terpretation was placed on the load limit, so legal-limit hauling was resorted to.

While City Constructors hire haulers for hauling the hot mix asphaltic concrete, they also use three of their own trucks as pace setters.

The subgrade was prepared and rolled over the full working area prior to the placing of the subbase material. The subbase was then spread with Caterpillar No. 12 motor patrols. It was then rolled by both self-propelled and pull type pneumatic rollers selected and weighted to meet the compaction specifications of 95 per cent of standard density, AASHO T99-49.

The crushed sandstone base course material was next deposited, windrowed and bladed out. The optimum moisture content for the sandstone, about 10 per cent, proved somewhat difficult to maintain and much of the rolling had to be done at a moisture content slightly under optimum.

Equipment Used

Equipment variously used consisted of a Buffalo-Springfield Kompactor, Lima vibratory compactor, grid roller, self-propelled pneumatics, and tandem steel roller.

The surface tolerance of ½" in 12' posed somewhat of a problem in securing density and the required surface tolerance at the same time. For the most part the contractors overcame this by securing density first and then tight-blading and rolling the material to the required tolerance.

It proved to be particularly important to secure the proper density in the base course in the first attempt. When base had been rolled out and finished and the density test showed inadequate compaction, it was then necessary to scarify up the complete depth of sandstone base course and start all over again.

Each of the three prime contractors forming the joint venture used the method he preferred.

● Lima Roadpacker was brought in to determine effectiveness of vibratory compactor.

● Buffalo-Springfield Kompactor proved effective for Nilson-Smith in compacting base course.

Sawing Out Samples Champion concrete saw equipped with Clipper diamond blade, saws field density sample from asphaltic concrete pavement. International R-110 pickup carried saw and mounted barrel for coolant water.

The hot-mix asphaltic wearing surface was spread by four Barber-Greene spreaders to a depth of 2½ in. on residential streets and 3 in. on arterials. Depth was continually checked by measuring as the spreader worked and was kept uniform. Steel-wheel rollers were used closely behind the spreaders for breakdown rolling. This was followed by rubber-tire rolling with 25-ton Fergusons, unloaded so that they had a total weight of about 11 tons.

Test Personnel

All field and control tests were performed by Western Laboratories, requiring 15 men on the job most of the time. Six local men were trained for this work. Western Laboratories furnished all scale men at subbase aggregate plant, hot plant and sandstone quarry. While most tests were performed with equipment on the project, periodic samples were sent to the home laboratory in Lincoln, Neb., for checking. Sandstone samples were sent to Lincoln for the Los Angeles abrasion test.

The size of the field testing operation for such a projects is seen in the fact that the daily runs per 8-hour shift included some 50 density tests (sometimes up to 70 or more) using a Soiltest Densometer, 25 sandstone gradations (from both hot and cold bins), 60 to 70 moisture tests, two asphaltic concrete extractions, four sets of Marshall tests covering stability flow, specific gravity voids and voids-filled.

Also five or six density tests have been run each day on samples cut from the asphaltic concrete pavement, running a test about every two blocks and using a Champion CS-400 concrete saw with special asphalt cutting blades.

Concrete cylinders were prepared, three for each 100 cu. yd. of concrete. All asphalt tests and many of the other field tests were run in a laboratory housed in two trailers adjacent to the asphalt plant. This convenient location enabled samples to be secured easily, and at the same time the scale men on the job could weigh the asphalt trucks. Tests in regard to the sandstone base course material were performed with laboratory equipment at the crusher site.

For Western Laboratories, Gene Smith was in charge with William Schultz as assistant. Emrys Samualson was in charge of inspection of asphaltic concrete laydown, and Herman Olson on asphalt control tests.

Engineering Work

All engineering was performed by the firm of Harold Hoskins & Associates of Lincoln, Neb. Mr. C. L. Dier, senior partner and project manager, devoted most of his time and activities to public relations and the over-all aspects of the project. Carl Christopherson, project engineer, was in active charge of the field engineering on the project during 1957, assisted by James Nichols.

City Constructors is a joint venture of the following three large construction companies of Great Falls, Mont.: Nilson-Smith Construction Co., McLaughlin, Inc., and S. Birch, Inc. The affairs of City Constructors are handled by a management committee consisting of Al McIntyre, vice president of S. Birch, Inc.; C. S. (Red) Muir, general superintendent, McLaughlin, Inc.; and Cliff Craig, general superintendent, Nilson-Smith. The meetings of the management committee were informal and took place as necessary to keep the cooperative venture rolling as smoothly as possible at the widely scattered construction scene.

The active management of City Constructors was under the supervision of A. C. (Bud) Nesbitt, project manager.

● Bare pavements all winter—that is the aim today, with the help of more patrolling with salt spreaders in conjunction with plowing.

Equipment Rental For Winter Maintenance

For snow and ice control, most northern highway departments however find it an advantage to have rental arrangements made to help meet emergencies. Here are three replies to a query on the subject by the Editors.

One of a Series of Reports on Winter Maintenance Procedures

1.

Washington State. By John L. Stackhouse, Maintenance Engineer, State Department of Highways.

THE PRACTICE of the Washington state department of highways is to rent supplementary equipment from outside agencies for emergency work or to keep highways open during blizzards or abnormal conditions. Rentals have increased the last four years due to the increase in traffic and the demands of the traveling public.

Generally, under ordinary winter conditions, our maintenance men are equipped with adequate truck snow push plows equipped with mechanized sanders, graders, rotaries, bulldozers, front-end loaders and trucks with sanding bodies, etc. But it is not economical to purchase the extra units for standby purposes needed for emergent conditions, such as large snow slides on our mountain passes or drifting snow during blizzards.

We have been successful in renting the needed equipment on a fully operated basis from contractors, logging companies and other governmental agencies, principally the U.S. Forest Service. In one district in 1955, contractors were contacted regarding trucks equipped with push plows and mechanical sanders. Because of the cost of the plow accessories with no minimum standby time in the agreement, we had no "takers."

While some contractors do not want to rent motor graders, bulldozers or trucks for emergency work, the department has, with such minor exceptions, had no trouble making agreements each fall for use of equipment on an "if and when needed" basis and fully operated. In most cases, with the contractors or logging com-

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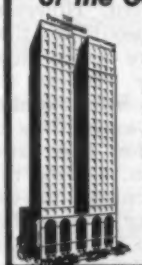

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KNOTT HOTELS

● **Rented equipment helps most highway departments today to meet storm emergencies and handle peak loads with less cost. (Photo courtesy Massachusetts Department of Public Works.)**

panies an agreement is made by letter from the owner to the district office, agreeing to rent the units at a stated cost per hour fully operated. Payment is made to the owner upon receipt of a voucher itemizing the hours of time which, of course, has been checked by the highway department supervisor.

Formal rental agreements are made with the U.S. Forest Service. This type of agreement is not on a fully operated basis, although actually, in most cases, the state only pays the agreed cost per hour.

It is difficult to report the numbers of units and length of time equipment is rented each winter because of the variety of weather conditions encountered. However, as a rough guess, I would say that 6 to 8 bulldozers are rented from anywhere from one week to six weeks, 3 to 5 blades from one day to three weeks, and some 10 to 15 front-end loaders for from two weeks to two months. During the 1955-56 winter, we rented a Sno-Go rotary from a logging company for three weeks to help keep open a section of highway mainly used by logging trucks and vehicles.

Rates Vary

The rental rates vary widely, mainly because of the location and the rate set by each owner. While the state does not take formal bids, quotations are requested from all available owners and the lowest bid from a competent operator is accepted.

Listed here are the types and rental rates that have been paid in the past. All rates are on the basis of the equipment being fully operated.

Bulldozers from D4 to TD14 size—
$8.50 to $12.53 per hour
Dump trucks, mostly 5 cu. yd. capacity—
$6.57 to $6.79 per hour
Heavy duty motor graders—
$10.00 to $12.50 per hour
Front-end loaders—
$250.00 to $350.00 per month
Front-end loaders, 1 yd. capacity—
$10.00 to $11.30 per hour
3 Auger Sno-Go rotary—
$18.00 per hour

The situation in Washington is that most contractors and logging companies welcome the chance to rent their equipment during a period it is not being used on their own work. We believe it is a good deal for this department, for if we could not rent, it would be necessary to purchase extra units as standby, which is very expensive from the viewpoint of depreciation alone. We cannot afford to own this equipment as long as it can be rented. To date, this rental method has been satisfactory to this department.

The district engineer may also designate reimbursement for availability use of such expressly identified county-owned equipment which has facilities and attachments for the control of snow exclusively. Generally, the equipment intended to be designated consists of heavy duty rotary, rotary wing and V-type snow plows with or without trucks and four wheel drive trucks.

The equipment used by the counties includes those types particularly adapted for use in that particular county.

Our inventory of equipment rented for snow and ice control work for the winter of 1955-56 in conformance with the above plan is as follows:

Trucks		5,540
Truck plows		
(1) Displacement plows for trucks	4,194	
(2) Rotary plows for trucks	158	
Total truck plows		4,352
Tractors		499
Tractor plows		
(1) Displacement plows for tractors	265	
(2) Rotary plows for tractors	3	
Total tractor plows		268
Graders		710
Power shovels		186
Total of all equipment		11,148

2.

Notes on Massachusetts Practice. By G. G. Love, Maintenance Engineer, Department of Public Works.

SNOW AND ICE control equipment used by the Department of Public Works includes about 1,000 hired trucks, loaders and other units, rented at different periods.

Rented trucks vary in size from 5,000 lb. to 40,000 lb. Registered Carrying Capacity. An effort is made to secure trucks of a size that will do the most efficient job at the most reasonable costs. This is not always possible in some sections of the state. Due to the unavailability of trucks of a specified size we must, through necessity, hire larger or smaller trucks when needed in an emergency at such locations.

The state-owned equipment is put to work at the start of a storm form such snow and ice control

and the hired equipment is called upon as needed as the storm progresses. The state-owned equipment is used in most cases on the major through routes and the hired equipment on the lesser traveled routes and feeder roads.

Prior to the winter season a table of maximum rates for hired trucks and equipment is established and distributed to the eight districts. The district maintenance force secures names of truck and equipment owners in the sections where hired equipment is necessary, and lists those who are interested in doing this type of work. Names of these owners with a complete description of the truck or equipment and the rate are submitted to the main office for approval.

During a storm, hired equipment is put to work as needed by the district maintenance supervisors and is released as soon as the storm abates and the roads are cleared. This time varies with the duration and the severity of the storm. All hired equipment must be on call 24 hours a day during the winter season. Only the reliable owners are called on except in the case of a heavy storm.

The actual number of pieces of rented equipment put to work varies with each storm, but during the severe storms of March and April, 1956, as many as 900 units were employed at one time.

The rates paid during the past winter season ran from $3.50 to $8.50 per hour for sanding and from $5.00 to $9.00 for plowing. Many hired trucks are equipped with privately owned plows and sandspreaders for which an additional rate is paid. State-owned plows are furnished, the trucks not having their own.

3.

New York's Winter Set-Up. By L. H. Krick, Assistant Superintendent of Operations and Maintenance, State Department of Public Works.

THE HIGHWAY Law of New York as amended in 1946, provides that snow and ice control work on the state highways may be done by a municipality, meaning county, town or village. The state superintendent of public works is authorized to enter into an agreement with the municipality for the performance of such work upon such terms, rules and regulations as deemed by the superintendent to be for the best interest of the public. It is the intent of the law to grant priority to the county to per-

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form such snow and ice control work within the boundaries of that particular county. Such counties are authorized to enter into a contract with other municipalities located in the same county, for the performance of the work as a subcontractor.

Counties in New York state have elected to do snow plowing on 10,735 miles of our state system and 4,077 miles of ice control. The balance of the more than 13,000 miles on the State System is accomplished by state personnel and state-owned equipment.

Reimbursement is made for the use of all trucks, plows, graders, loaders, spreaders and other mechanical equipment furnished by the county, as required and approved by the district engineer for the time of its use in accordance with current equipment rental schedule as prepared by the superintendent of public works. Such rental rates cover all items of initial cost of the machine and accessories, fuel and supplies, public liability insurance premiums, depreciation and obsolescence, together with the cost of all repairs, repair parts, maintenance, upkeep and replacement, storage, repair shops.

"Need Better Road Survey Methods"—ASCE Committee

Declaring that "the design and execution of highway surveys has failed to keep pace with the increasing volume of new highway construction and with today's complex and critical construction design standards, the committee on Highway and Bridge Surveys, Surveying and Mapping Division, American Society of Civil Engineers, has filed a progress report emphasizing the need for study and action in this field.

The report, published in the Journal of the division as part of the proceedings of ASCE, says in part: "The sudden emergence of the nation's largest road building program . . . focuses new attention on the necessity for studying and redefining the fundamental surveying requirements of the modern highway project.

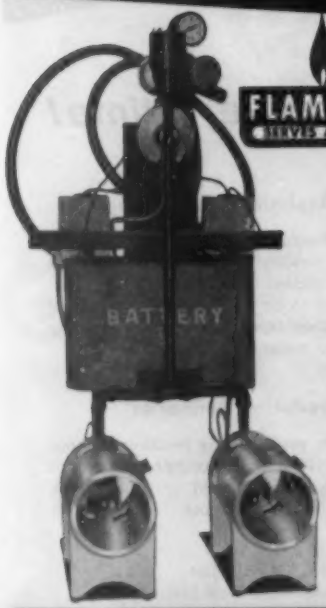
"No longer is it economically defensible to execute highway surveys with the short-range objective of serving only the immediate needs of construction. The modern highway survey, when governed by high accuracy standards and when properly monumented and described, can provide for all time adequate reference controls for future reconstruction and betterment program."

The report observed that the increased use of photogrammetry is linked with electronic computing methods to speed earthwork quantity estimates in the study of alternate routes. The two techniques also can aid in a vast variety of surveying calculations such as the computation and adjustment of traverses." The committee went on to say:

"The need is for more accurate field surveys, traverse and levels, to control the stereo-compilation of topographic maps used in highway location studies and for coordinating the several subdivisions of extensive highway projects, not uncommonly 100 or more miles long. This need has led to the necessity of defining and disseminating new and higher specifications for such surveys. The planning, design and layout of intricate interchanges and multiple-level grade separation projects has placed additional emphasis on the need for more accurate surveys.

"In recent years the spectacular increase in the number and length of over-water highway crossings makes essential the description of related engineering procedures for executing surveys of large bridges."

FLAMEGAS INTRODUCES NEW ASPHALT & TAR KETTLE BURNER



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BURNERS GUARANTEED

- Speeds up heating of tar, asphalt and pitch.
- Compact, portable unit available with single or multiple burners.
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Flamegas ASPHALT and TAR KETTLE BURNER speeds up heating. After burner is lit, set controls operate with complete safety. You're set to go when your work crew arrives.

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. . . for more details circle 271 on enclosed return postal card

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SPREADS SALT 200 LBS. PER MILE
OR IN ANY DESIRED AMOUNT
Lays a Narrow Strip or Full Traffic Lane

Handles all granular materials — salt, cinders, sand, calcium chloride, rock chips. Spreads at speeds up to 30 M.P.H. Clutch-controlled flow: steady or intermittent for hills and intersections.

Write for complete information

SWENSON SPREADER & MFG. CO.
LINDENWOOD, ILLINOIS

. . . for more details circle 322 on enclosed return postal card

New Products

Curb or Curb and Gutter of Asphaltic or P. C. Concrete

The machines here pictured—Stephens-Canfield automatic curber and Smith-Field automatic curb and gutter machine, both brought out by E. L. Hardin Associates, Inc., Salisbury, N. C., are designed for economic production of high strength, correctly finished curbs and gutters of either Portland cement or asphaltic concrete in either straight or curved alignment.

The curber will operate on subgrade, base or finished pavement. A track of small angle irons in 10-ft sections will give maximum uniformity but is not essential. No forms and no hand finishing are required except for the joints in P.C. concrete, which are made with a simple raking tool and transverse form soon after the passage of the machine.

Hardin's Curb Machines

In operation, materials fed into the hopper are passed through metering gates into the lower conveyor screw casings and the forming chamber, then extended under compactors to make the complete and finished curb or curb and gutter. With asphaltic concrete, a hot tack coat is applied ahead of the machine.

For more details circle 128 on Enclosed Return Postal Card.

Heated Asphalt Roller Works Flush to Curb and Walls

A new heated asphalt roller, said to eliminate need for tamping and smoothing irons, is available from Charles M. Ellis Mfg. Co., 6823 N. Walnut St., Kansas City 16, Mo.

The machine works flush to curbs, walls and foundations, is designed for

Ellis Asphalt Roller

patching of roads, driveways and parking lots. It contains only one moving part and is claimed to operate from 2 to 3 hours on 1 gal. of fuel oil. Weight is 110 lb. but heavier models are available.

For more details circle 129 on Enclosed Return Postal Card.

New Rubarite Products Have Superior Dispersion Qualities

The Goodyear Tire & Rubber Co., Akron 16, Ohio, has announced a new line of improved Rubarite products by Goodyear and the acquisition of the Rubarite patents and trade-marks from Rubarite Incorporated.

These improved bitumen rubberizing materials, containing 40% by weight of unvulcanized synthetic rubber are stated to have superior dispersion and suspension qualities in asphalt and tar to assure maximum improvement in toughness, ductility, flexibility, adhesion, and minimum temperature sensitivity.

The sale of these new products will be handled by Goodyear Chemical Division.

For more details circle 130 on Enclosed Return Postal Card.

Tractor-Mounted Rotary Drill Has 35,000 lb. Pull-down Power

A new tractor mounted rotary air drill, announced by Davey Compressor Co., Kent, Ohio, has a rated capacity of 10 in. blast holes and 35,000 lb. pull-down pressure.

The drill uses compressed air for cleaning drilled holes. Air pressures of 10 to 125 psi are available from a 6-cylinder Davey 500 cfm capacity compressor.

Originally designed for mounting on either a new or used Caterpillar D8, the drill can be adapted to other tractors of similar size. The drill is so designed that full use of the hydraulically controlled blade is retained. Tractor engine supplies power to the entire drilling unit through a chain and gear type power transfer case.

Draw works are of the 2 drum type, permitting handling of drill pipe or Kelly and swivel in the mast. The latter is of welded tubular steel construction with angle-mounted roller bearing crown block sheaves.

For more details circle 131 on Enclosed Return Postal Card.

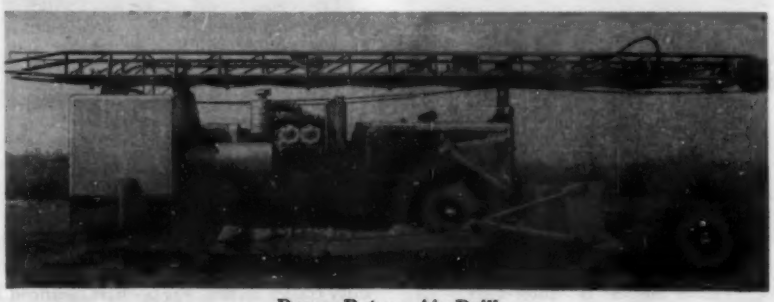
Roller Attachment Gives 4½ Tons of Compaction Pressure

Midland Manufacturing Company's new "Graderoll" is a rubber-tired unit that is installed easily and converts any

Midland "Graderoll" Attachment

tandem drive motor grader into a combination road maintainer and pneumatic-tired compactor-roller. Compaction weight on each of the 6 tires, when installed on a 23,000-lb motor grader, is listed as 1,536 lb—approximately 4½ tons total. The unit is stated to deliver effective compaction in one operation following grader blade material distribution.

The grader-roller combination is versatile in application and adapted to resurfacing and secondary road con-



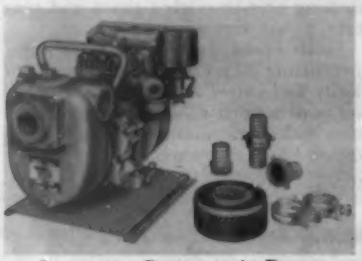
Davey Rotary Air Drill

struction and maintenance. For further information address The Midland Mfg. Co., Huntington National Bank Bldg., Columbus, Ohio.

For more details circle 132 on Enclosed Return Postal Card.

Cut-Off Design in Contractor's Pump Affords Extra Capacity

A new contractor's pump has been introduced by Lancaster Pump & Manufacturing Co., Inc., Manheim Pike, Lancaster, Pa. In addition to the usual features found in pumps of this type, the new Lancaster features a 4 volute cut-off design which is stated to yield extra high capacities in the high pressure range without overloading the 2 hp 4 cycle gas-engine.



Lancaster Contractor's Pump

For more details circle 133 on Enclosed Return Postal Card.

Rotary Snow Plow Mounts on Any 4-Wheel-Drive Truck

A new rotary snow plow for state, county and municipal snow removal has been announced by Bros Incorporated, 1057 Tenth Ave. S.E., Minneapolis 14, Minn.

Named the Bros Model "B" Sno-Flyr, this plow is suitable for any four-wheel drive truck in the 17,000 GVW range. It is front-mounted by a universal hitch that permits interchange with push plows.

It has a capacity for handling 20 tons of snow per minute, casting distances up to 75 ft. Hard, wet or chunky snow conditions do not hamper casting performance. Loading chute permits rapid loading out to trucks in crowded downtown or urban streets.

Bros Model "B" Snow-Flyr

The casting chute rotates 360 deg. to control placement of snow in adjacent areas. A capper on casting chute controls height of snow stream being ejected.

For more details circle 134 on Enclosed Return Postal Card.

Instrument Serves as Boom Spot Air and Safety Control

A boom spot indicator, announced by Viking Instruments, East Haddam, Conn., is claimed to give boom rig operators increased effectiveness in all phases of boom rig operations and to be an added safety factor as well as an instrument for increasing production.

Invented by a boom rig operator it is maintained that the boom spot indicator eliminates costly manual multi-handling operations. The company states the instrument leaves "no margin for error" in difficult boom rig operations where reproducible spotting is an important factor. It is claimed that the operator eliminates any chance of passing his boom from the safe operation zone into any degree of the danger zone.

For more details circle 135 on Enclosed Return Postal Card.

New Alidade Especially Suited for Accurate Farmland Mapping

A new farm type alidade for agricultural and small-scale topographical surveys has been introduced by the David White Instrument Co., 2051 N. 19th St., Milwaukee 5, Wisc.

David White Alidade

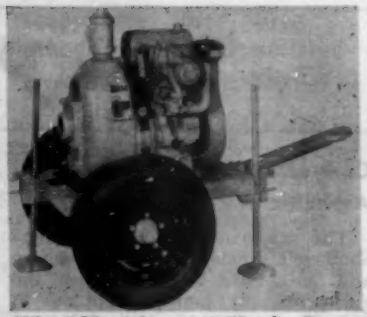
Known as No. 9179, the new instrument is especially suited for farmland mapping; is said to be accurate, sturdy and reasonably priced.

Telescope length is 10 in. Power is 10 times magnification of high resolution and permits detailed reading at a distance. Its field of view of 2.45 degrees, 50 minutes for wide coverage.

For more details circle 136 on Enclosed Return Postal Card.

3 in. Pump Has Improved Wheel Mounting and Automatic Jacks

A 3 in-20M pump with new heavy duty trailer mount has been announced by Rice Pump & Machine Co., Belgium, Wisc. Contractors doing road work in muddy or rough terrain are stated to have requested this mounting. Automotive type jacks have been adapted for steadying stands to permit exact leveling. The Timken taper roller bearing wheels are equipped with standard 5:90 x 15 in. implement tires to assure ease in handling on rough ground. Towing tongue telescopes when not in use. This mounting with large towing ring tows easily, may be pulled by a truck and need not be hoisted up onto a truck for moving from job to job. Rice offers this mounting on 20M, 40M, and 90M sizes (3 in. thru 6 in.).



Wheel Mounting on 20M 3 in. Pump

For more details circle 137 on Enclosed Return Postal Card.

Hydraulic Cutter Speeds Cutting of Reinforcing Rods, Bars

A new hydraulic cutter, announced by H. K. Porter, Inc., Somerville 43, Mass., is stated to speed up the cutting of rods and bars up to 1⅜-in. diameter.

Equipment consists of a light weight portable cutterhead, a heavy duty power pump to supply oil pressure and a single high pressure hose of convenient length to deliver oil to the cutterhead.

The cutterhead is equipped with a comfortable pistol grip that may be adjusted through a full 360°. A small electric switch button located in the pistol grip controls the cutting action. Only light finger pressure is required to cut capacity size rod.

Porter Hydraulic Cutter

It is stated that the quick bite cuts through carbon and alloy steel rods, reinforcing rods and drill rod in sizes up to 1⅜-in. diameter.

For more details circle 138 on Enclosed Return Postal Card.

Electronic Power in Radio Units Eliminates Vibrator Replacement

All-electronic power supplies in a new line of mobile radio units is said to eliminate vibrator replacement problems. Called the "T-Power" radiophones, the new two-way radio units

Motorola "T-Power" Radio Unit

incorporate a transistorized switching circuit in the power supply in place of the conventional vibrator. In this way, the part most frequently requiring replacement in mobile radio units —the vibrator—and the "hash" produced by the vibrator are eliminated.

More information about Motorola "T-Power" radio units can be obtained by writing to Motorola Communications and Electronics, Dept. TIC, 4501 Augusta Blvd., Chicago 51, Ill.

For more details circle 139 on Enclosed Return Postal Card.

Mobile Work Shop Has Winch-Equipped 5-Ton Crane

Cemco Mobile Work Shop

A truck-mounted shop on wheels has been announced by Cemco Industries, Inc., Galion, Ohio. A feature of this work shop is the winch equipped 5-ton crane which can be completely disassembled and stored inside the truck when the vehicle is in transit.

The truck also has a 125-cu. ft. air compressor, 15 KV generator—300 ampere, 40 V. welder. The air compressor and the generator-welder are operated by a Cemco split-shaft power take-off. Compartments and sidewall bins provide ample storage for parts and tools.

For more details circle 140 on Enclosed Return Postal Card.

Tractor Mounted Rippers Have Curved, Tapered Shank

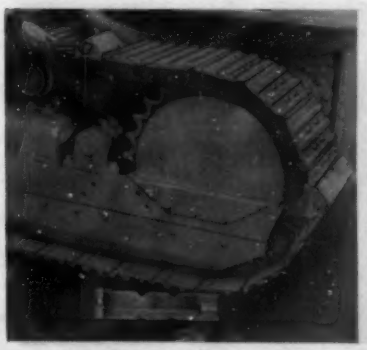
New tractor mounted rippers for International Harvester TD-14, 18 and 24 tractors, announced by Greenville Steel Car Co., Greenville, Pa., have exclusive curved and tapered shank design that is claimed to give tremendous penetration and shattering action lifting and breaking rock, and prying out imbedded boulders. Shanks cast from special manganese-molybdenum alloy steel. Swivel-mounted they can turn 15° in each direction. Depth and pitch adjustment can be set for each specific job. Three-shank unit weighs 5 tons—rips to 24 in. Special drawbar replaces tractor drawbar and brackets and takes full tractor pull. Double-acting hydraulic power gives fast, positive fingertip control, permits use of tractor weight for better penetration and keeps ripper shanks in the ground. Fully tractor-mounted, can maneuver in tight corners and make short turns.

For more details circle 141 on Enclosed Return Postal Card.

Loader Production Increased 30% With New Detachable Grousers

A new type of removable grouser which bolts onto the street shoes of Case TerraTrac crawler tractor-shovels has been announced by J. I. Case Co., Racine, Wis.

Available for the new larger capacity 1½ and 2 cu. yd. models, the grousers are said to improve traction when working in mud, sand, or on steep slopes. Set of 10 grousers (5 for each track) can be attached with an ordinary hand wrench in 10 minutes and will increase tractor-shovel production up to 30% in slippery going, it is claimed. Special triangular design is said to prevent dirt from packing in back of grousers, thus assuring good traction even in extremely sticky mud.



Case Detachable Grousers

For more details circle 142 on Enclosed Return Postal Card.

Tractor-Mounted Plow Loads Trucks on Either Side

The new series "A" Snow-Flyr rotary snow plow is announced by Bros Incorporated, 1057 Tenth Ave. S.E., Minneapolis 14, Minn. The series "A" mounts on the front-end hydraulic loader of the industrial wheel-type tractor. It utilizes the same pins and connections used to attach the loader bucket. No extra braces or drilling are required.

Bros—Model "A" Snow Flyr

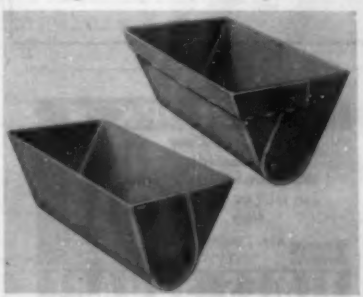
Snow removal capacity is 3 to 4 tons per minute in average snow conditions. The plow is particularly well suited for snow removal work around plant yards, storage areas and sidewalks as well as airports, streets, side roads, parking lots and railroads.

A bucket tilting device provides positive operation control on plow and engine at different elevations; the unit thus can be raised to the top of high drifts, to chew them down.

For more details circle 143 on Enclosed Return Postal Card.

Elevator Buckets Brake-Formed From Single Steel Plate

A new, welded-steel elevator bucket is being manufactured by Wincar Welders, 3249 Cherry Ave., Long Beach, Calif., and marketed under the tradename of "J" Buckets.



Wincar "J" Buckets

The new "J" buckets are brake-formed from a single, shaped steel plate. They are light in weight and are stated to be exceedingly strong

REFLECTORIZE CULVERT WALLS

. . . FOR 17¢ A SQUARE FOOT

Fast, one-step reflectorization as easy as painting! Hazards reflectorized with 3M's "Codit" Liquid flash brilliant warning at night for safety. Treatment costs a low 17¢ per square foot. Buy supply from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minnesota.

Get "Codit" Reflective Liquid in 6 oz. aerosol spray or 4 lb. can or complete safety kit.

3M

For more details circle 341 on enclosed return postal card.

Construction Superintendent Wanted

Superintendent for Engineering type construction such as pumping stations, sewage and water treatment plants and flood control work. Steady employment for aggressive qualified man. Prefer man with engineering background. Send complete details on background and education. Only those well qualified need apply. Must be willing to move around southern states at job completion.

Write Box 1187, Roads & Streets, 22 W. Maple St., Chicago 10, Ill.

and long-lived. Corners are round, smooth and free of welds and other irregularities. As a result, the buckets discharge loads rapidly and completely.

For more details circle 144 on Enclosed Return Postal Card.

Heavy Duty Dump Truck Is Stated to Handle 40,000 lb. Payload

A new dump truck, announced by Diamond T Motor Car Co., 4401 W. 26th St., Chicago 23, Ill., is sturdily constructed and engineered especially for really tough grueling jobs. The truck is stated to easily handle a 40,000 lb. payload. The two axles have a combined rating of 65,000 lb.

921BN-SFDD4600 Diamond Dump Truck

Model 921BN-SFDD4600 is shown here with a 12½-cu. yd. dump body. Tandem rear axle of the unit is the extra-heavy-duty Timken SFDD4600, double reduction type, rated at 50,000 lb. It provides an inter-axle differential with lockout. Maximum tire size is 12.00-24. Front axle is the Shuler FE-15, which is rated at 15,000 lb.

For more details circle 145 on Enclosed Return Postal Card.

4 to 20 Ton Vibratory Roller Compacts 30 to 50 in. Deep

The ABC model SW, 2 wheel tandem roller introduced by Combined Agencies Corp., Suite 812, Barr Bldg., Washington 6, D. C., is said to operate as either a 4 ton smooth roller or a 6 to 20 ton vibration roller, thereby replacing 3 or more conventional types. The SW is claimed to compact from 30 to 50 in. deep. It can climb on any truck, for movement to distant jobs. The mechanism is fully protected against dust, and ball bearings operate a full 1200 hours before first lubrication is needed. The roller has hydraulic steering and vibration is insulated from operator's seat. The power unit has an 18 hp. Deutz diesel engine, air cooled with an electric starter (serviced in U. S.) Vibration frequency is infinitely variable between 2400 and 3400 rpm.

ABG Model SW Vibratory Roller

For more details circle 146 on Enclosed Return Postal Card.

Hydraulic Digger Digs Holes Up to 9-ft. 4 in. deep

A hydraulic hole digger has been added to the Powers-American line of utility bodies and equipment of McCabe-Powers Auto Body Co., 5900 North Broadway, St. Louis 15, Mo.

The digger, designated "Earth Master," is suited for use with the Powers-American Series PM-2 "Pole-Master" hydraulic derrick. It can be installed on most "Pole-Master" derricks now in use, or factory-mounted in conjunction with a derrick and body built to fit individual operating requirements.

McCabe-Powers "Earth-Master"

Fully hydraulic-unit powered by a hydraulic pump driven by the truck engine will dig holes up to 9 ft. 4 in. in depth, at various angles, in practically all types of soil. The auger is guided at all times, to assure straight, clean holes. It travels up and down on a twin-column support frame which can be turned to various positions and extended or retracted to fit terrain and working conditions.

For more details circle 147 on Enclosed Return Postal Card.

Portable Building Useful as Field Office, Shed or Workshop

A standard-design construction building on wheels for all-out mobility from job to job, has been introduced by Economy Buildings Inc., West Chicago, Ill.

Useful for field office, storage or temporary housing, tool shed or workshop, the economy mobile construction building is a rigid, factory-constructed, 7½-ft. x 16-ft. building. It is union-built of the finest kiln-dried, tongued-and-

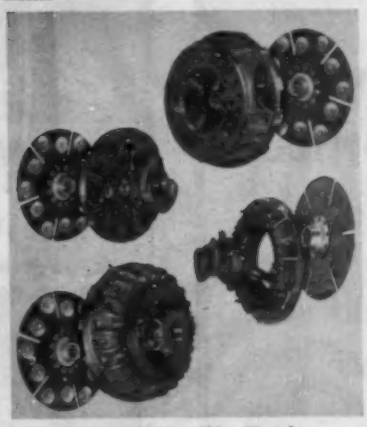
Economy Mobile Building

grooved west coast lumber and mounted on a heavy-duty steel undercarriage. Trailer is equipped with tires and electric brakes controlled by the driver.

For more details circle 148 on Enclosed Return Postal Card.

New Clutches Offer Increased Capacity and Longer Wear

A new clutch arrangement, using friction material with a ceramic base for use in heavy-duty and off-highway machines, has been announced by Borg-Warner International Corp., 36 S. Wabash Ave., Chicago 3, Ill. Increased capacity, better heat disposal, better ventilation, cooler running, no fading, longer wear, fewer adjustments and more usable lining material are some of the improvements claimed for this new clutch. Borg-Warner International supplies the Rockford Morlife clutch in both over-center and spring-loaded types in a wide range of sizes up to 18 in., single and double plate, designed and engineered for spectific applications.



Rockford Morelife Clutches

For more details circle 149 on Enclosed Return Postal Card.

Fork Lift Offering 3 Methods of Mounting has 4000 lb. Capacity

A new fork lift, announced by Henry Manufacturing Co., Inc., 1700 N. Caly St., Topeka, Kan., offers job-site materials handling with "big tire" mobility. It is available at present for IHC and John Deere tractors.

Three models are available. The Henry tractor-lift (TL-4316) features a 3-rail mast. Its 16-foot lifting height telescopes to a 93 in. down height. Henry's Model TL-2510, also a 3-rail lift, goes 10 ft. high and has a very low 64 in. down height. The third model (TL-4210) has a 2-rail mast, affording a 10 ft. lift and 87 in. down height.

Capacity of the Henry tractor-lift, rear mounted, is 4,000 lb. It has a 12 in. ground clearance.

Each model offers three methods of mounting on the tractor: It can be rear-mounted, rear-mounted with operator reversed, or front-mounted.

Henry Tractor-Lift

For more details circle 150 on Enclosed Return Postal Card.

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1—Blaw Knox auto. batch plant w/ 100 ton agg. bin & 1200 bbl. cement silo, etc.

1—Johnson TY270 auto. batch plant w/ 4 agg. & 1 cement comp., 2150 bbl. cement storage, elevator, screw, 2 - 24" x 225' inclined conveyors, 4 yd. mixer.

1—Johnson batch plant w/ 120 yd. 4 comp. agg. bin & 1000 bbl. silo.

1—Noble CA506 auto batch plant w/ 500 ton 6 comp. agg. bin, elevator, 5000 bbl. silo, conveyors, etc.

3—Barber Greene Model 848 asphalt plants, complete

1—Cedar Rapids E-4000 asphalt plant, complete

1—Cedar Rapids Model CM 60 TPH asphalt plant

1—Simplicity Model S-50 asphalt plant

1—Pioneer Model 81 portable asphalt plant

1—Simplicity Model S-80 asphalt plant

2—Cedar Rapids Model FA asphalt plants

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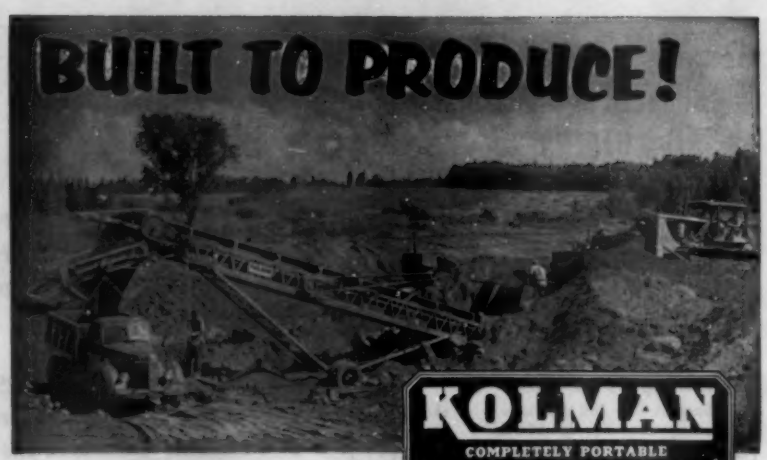

KOLMAN 36" Model 101 Can Load and Screen Over 800 TPH

Kolman's rugged construction in the Model 101 portable conveyor-screen plant makes it a brute for production. The 36" x 50-foot unit shown is capable of loading over 800 tons per hour! Owned by Lindquist-Olson & Co., Cambridge, Minn., it is one of many such plants in use throughout Minnesota in highway construction. It is pictured grading and loading base lift material for a Minnesota Trunk Highway 66 improvement project in Aitkin county.

Included on the plant is the SB-80 Kolman single-deck Vibrating Screen—over 30 square feet of vigorous screening power. It is capable of carrying either a single, double or triple-deck vibrating screen without additional support.

The Kolman Model 101 is available in belt widths from 18" to 42" and in lengths up to 60 feet on portable plants. It can be equipped with a dozer trap, casting hopper, feeder-trap, or feeder-hopper. The complete plant is portable with no disassembly whatever. Adaptable to any type of feeding—dozer, dragline, shovel, front-end loader and others.

Best of all, you'll find the Kolman 101 costs less than comparable heavy-duty conveyors. Better check into it now!

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FOR SALE

1 Adnum Paver 1941. Converted to stone machine.
1 Apsco Spreader 1953. Used 4 months.
1 Barber Greene Stone Machine 1946.
1 BS Apsco 3 wheel Roller 1941. No motor.
1 Hauck Heater, Littleford 1950.
1 Huber Reed Maintainer 1951.
1 1½ cu. yd. Pettibone Speedal Front End Loader 1954.
1 Koehring #19 ¾ yd. Buckhoe 1950. Needs repair.
1 HD 10 Allis-Chalmers Bulldozer. Needs repair.
1 HD 14 Allis-Chalmers Bulldozer. Needs repair.
1 Quarrymaster I. R., GD-8 1951. Complete with all accessories.
1 Kennedy #37½ Crusher less electric motor, includes spare eccentric and lower mantle.
1 75 HP A.C. Motor for Compressor. 600 rpm, 3 ph, 60 cy, 440 V, 94 A, open.
1 25 HP G.E. Motor, Type MT332-8-25-900, 220 V, 3 ph, 60 cy, 64 A, open.
4 Westinghouse Transformers 750 KVA, 34,500 Primary Volts. 480V, secondary volts, 60 cy, 1 ph.
4 Breakers, Main Line. Roller Smith 750 KVA, 600 V, 800 amps, Type HD, secondary.
1 Switch for 750 KVA Transformers, primary less Buss Bar.
1 Hunter Electric Vibrating Screen #50-2062 Feed End, #50-2061 Discharge End with Control box, 220 V, 60 cy, single phase.
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110	MP-115	35 to 60 ft.	Kansas City
130	MP-116	35 to 45 ft.	Alabama
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10" Telsmith Gyratory Crusher.
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1 Jaeger 2" Water Pump.
1 Telsmith Gyrator Crusher, 5 H Electric Motor.
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NOW YOU CAN RENT YAKE CLEARING BUCKETS

Designed to replace the conventional dragline bucket in all types of clearing. For removing stumps, brush and trees from the edges of creeks, rivers, lakes or any place inaccessible to other equipment. Buckets built for ½ to 4 yard machines.

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1—53x60 heavy-duty, double impellor, Iowa Mfg. impact breaker, complete with 50"x14'x6" heavy-duty cast manganese feeder. Used 7 months.

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Above equipment approximately four months old. Price $21,000 complete for above.
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Both machines just finished job recently and are located at Defiance, O.

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3500 Manitowoc Drag, 85', 2½ yd.
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All wide type tracks - good condition

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60 Ton ROGERS tandem axle drop deck, outriggers, air brakes, 1949 model tandem gooseneck, 16 tires and in excellent condition.

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25 Ton ROGERS 1952 Detachable Gooseneck.

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10 Ton ROGERS single axle model S10L, built 1952, 900 x 15 tires, air brakes, fenders on gooseneck. Like new $1,750.00

20 Ton LaCrosse 1952 tandem axle with beavertail, vacuum brakes $2,500.00

25 Ton ROGERS 1956 Tandem with Beavertail

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1—HD 5 ALLIS-CHALMERS Tractor with Tractomotive Loader
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1—Small Terratrac T. with Loader
1—T6 I.H.C. Tractor with Power Take-off
This equipment is in good condition and priced to sell.

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POWER MONARCH HYDRAULIC CONTROLS

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LITTLE GRANT PRODUCTS, INC., Peoria, Ill., has appointed the following as exclusive distributors of the construction equipment division: Dakota Iron Store, Sioux Falls, S. D., for Dakota; Girard Machinery and Supply, 5402 Roosevelt Ave., San Antonio, Texas, for 32 counties in the southern part of Texas: Construction Machinery, 2175 Newton Ave., San Diego, Calif., for the San Diego area.

THE BALDWIN-LIMA-HAMILTON CORP., construction equipment div., Lima, Ohio, has appointed two new distributors for Lima shovels, cranes, draglines and pull shovels. Werckle Construction Equipment Co., 718 Miller Ave., Rockford, Ill., will cover the northwestern portion of Illinois, consisting of fifteen counties, and Western Contractors Supply Co., 4817 Lake St., Melrose Park, Ill., covers the northeastern portion of Ill., which consists of 10 counties, and Lake, Porter and LaPorte counties in Indiana.

J. MURPHY, vice president since 1946, has been elected president of the Murphy-Phoenix Co., Cleveland, Ohio, manufacturer of Spra-Cure concrete curing compounds and other specialty compounds. Jack J. Scanlan has been advanced to director of sales of compounds to the road building industry.

ZIEGLER TRAILER AND EQUIPMENT, INC., 7400 Laured Canyon Blvd., North Hollywood, Calif., has been appointed distributor for Dorsey Trailers, Inc., Elba, Ala., for the state of California and also southern California distributor for Worthington Corp. line of concrete truck mixers and big mixers.

E. B. FALK has been appointed manager of advertising and sales promotion for Twin Disc Clutch Co., Racine, Wis. Mr. Falk joined the company in 1946 as sales correspondent and progressively advanced to sales engineer, application engineer, installation engineer and administrative assistant, general sales department.

Electronic Traffic Computer for Turnpike Traffic Data

A newly developed electronic traffic computer to measure vehicle speed and traffic densities is being installed on the New Jersey Turnpike. The device consists of detectors and computers to record traffic movements on multi-lanes simultaneously. It is an improvement over older methods which, besides being difficult to handle and requiring cables across travel lanes, generally would not permit computations on single lanes.

The new equipment will be portable, permitting its transfer and use to various areas of the turnpike. The several sensing instruments will be fastened to overhead bridge crossings on the turnpike and record the vehicles which pass underneath in the various lanes.

From the electronic sensing instruments, the data will be fed into telephone wires and transmitted to the Authority's administration building in New Brunswick where it will be recorded graphically and numerically.

The information obtained will be helpful in long-range planning since it will give an indication where lane widening is necessary.

Automatic signal division of Eastern Industries, Norwalk, Conn., has been awarded the contract for these computers. The installation will be the first of its kind in the United States.

No-Passing Lines Being Lengthened in Michigan

The state-wide program of lengthening the yellow no-passing stripes on hills has been ordered in Michigan as a means of helping reduce accident hazards.

In issuing this order highway commissioner John C. Mackie observed that many late model cars have been lowered in height, so that the sight distance for drivers on the highway is in effect reduced.

Traffic Safety Achievement

The value of modern expressways as savers of lives has been demonstrated dramatically on the Congress Street Expressway in Chicago. A long segment of this expressway rounded out its first year of operation in August without a single traffic fatality. During this time, 210 million vehicle miles of traffic was handled.

JERSEY SPREADER
MODEL 90

The new Model 90 Jersey Spreader is similar in design and construction to the larger, proven Model 102. . . . It has been adapted for use with smaller tractors and lighter loads. . . . Basic design has come from actual job experience to fill the urgent need for a spreading device which would do a faster, more accurate job. Contractors and municipal owners will find this model ideal for parking areas, development roads, city streets and shoulders.

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HASBROUCK HEIGHTS
NEW JERSEY

JERSEY SPREADER
REG. TRADE MARK

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Eliminates many types of drilling and shooting

May be used singly or in multiples

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Manufacturers' Literature

TRACTO LOADER LINE of front end wheel loaders is illustrated and described in a new 16 page catalog (1033-5-57) issued by Tractomotive Corp., Deerfield, Ill. Each of the 5 models currently in production are covered in the catalog. These models are the TL-200, a 22,100 lb. machine with a 2 cu. yd. capacity; the TL-12, 1⅛ cu. yd. bucket; TL-11, 1⅛ cu. yd. bucket; TL-10, 1 cu. yd. bucket and the TL-6, ½ cu. yd. bucket. Specifications for all the models are included.

"BIG PIPE BY ROBINSON, a new 4 pg. brocure describing the complete line of large diameter clay pipe, fittings and time-saving factory-made joints carried by Robinson Clay Product Co., 65 W. State St., Akron 9, Ohio, is now available. Sizes and descriptions of both standard and extra-strength clay pipe with pre-cast slip-joint and wedge-lock joints are included.

THE BARBER-GREEN CO., 400 N. Highland Ave., Aurora, Ill., has issued an 8-page circular illustrating and describing the new model 774 wheel ditcher. Features covered in the circular include the new floating differential, flexible connection between chassis and boom, all-hydraulic spoil conveyor drive, exclusive hydro-control, electric overhead release and all hydraulic controls.

THE LOGAN CLAY PRODUCTS CO., Logan, Ohio has prepared a new brochure illustrating and describing its complete line of factory-made clay pipe joints. The brochure lists specific uses for clay pipe, with emphasis on Logan's wedge-lock, slip-joint, and king-size clay pipe.

SUPERIOR CLAY CORP., Uhrichsville, Ohio, has issued a new 4 page brochure illustrating and describing applications of the New PT75 clay pipe joint sealment. Photographs which illustrate actual "on-the-job" installations of vitrified clay pipe using the PT75 including under-water installations, "pea soup" trenches, well point trenches, and in cramped quarters.

"50 YEARS OF INTERNATIONAL TRUCKS, 1907-1957, a 12 page, 2 color illustrated booklet recounting the 50 year history of International motor trucks is available from the consumer relations department, International Harvester Co., 190 N. Michigan Ave., Chicago 1, Ill. The brochure traces the progress of truck manufacture from the first high-wheeled, 20 hp "IHC Auto Wagon" built in 1907 down to the present day International operation and a chart showing the decade-by-decade increase of production which has accounted for more than 2,600,000 trucks over the past half century. Another section compares specifications of the early auto wagon with those of a representative group of modern International models ranging from 4200 to 96,000 lb. gross vehicle weight.

"HARDWEAR HARDWARE," the story of Cat track bolts and nuts is told in a new 8 page booklet (Form DE720), available from Caterpillar Tractor Co., Peoria, Ill. The booklet discusses in detail the requirements track bolts and nuts must meet in order to give top performance under abusive conditions. Since nearly all track bolts and nuts look alike, the booklet shows how machine owners can make their own tests to determine which hardware is best.

"I KNOW AIR POWER" (AT-116B), a new 8 page bulletin explaining troubles encountered, causes and remedies when using rock drills is available from the sales promotion department of the Le-Roi division, Westinghouse Air Brake Co., Milwaukee 1, Wisc. This bulletin, in addition to the rock drill "trouble shooting chart," has two pages devoted to growing usage of air as power. Pictures and drawings illustrate construction and maintenance of various air tools.

PIONEER ENGINEERING, division of Poor & Co., Inc., 3200 Como Ave., Minneapolis 14, Minn., has released an 8 page bulletin (Form #622), describing its newly re-designed line of apron feeders. More than 50 types and sizes of unit feeders and two sizes of portable apron feeders are described. The basic unit feeder can be furnished in one of four standard widths, five standard lengths and with one of three standard types of drives. The new bulletin contains general specifications, capacities and hp requirements on the complete line and numerous photos of different type and size Pioneer apron feeders.

"REPRESENTATIVE OWNERS OF CATERPILLAR V-8 AND V-12 DIESELS," a new booklet (#32321) is available from the advertising division, Caterpillar Tractor Co., Peoria, Ill. Since their introduction in 1949, the big Cat diesel engines have been shipped to owners throughout the free world, performing every type and kind of task, under all conditions. This booklet tells where, how and by whom they are being used. Illustrated, and in color, it lists the manufacturers who offer Cat engines to power their equipment. On the job photos tell the story of the varied industries where they are earning their keep, and more.

THE DAY BROOK POWER LOADER, which is installed on the truck frame immediately at the rear of the cab and operates within a full 360-degree area of the truck, is described in a new 4 page folder published by the Daybrook Hydraulic division, Bowling Green, Ohio. The power loader fits any stand-

and truck chassis. Load lifting capacities are given up to 4000 lbs, depending upon the boom length.

THE DAVEY COMPRESSOR CO., Kent, Ohio, has issued 2 new bulletins (LL-5802 and M-733) describing its new model M 8TA tractor-mounted rotary drill. One is a single page leaflet, containing detailed specifications. The other, a 4 page leaflet, describing both tractor and truck mounted units with rated capacities of 2000 ft.

THE NATIONAL SUPPLY CO., Two Gateway Center, Pittsburgh, Pa., has issued a new series of data sheets describing the National torque converters for excavators, cranes and shovels, and their advantages. The 4 page data sheet, #101, briefly explains 12 features of these single stage torque converters in operating this machinery. Representative types and makes of engines with which the 17 sizes of National converters can be used in the 100-to 1000 hp range are listed.

ALLIS CHALMERS MFG. CO., Milwaukee, Wisc., has made available a new 4 pg. specification sheet (MS 1191), which features a cut-away view of the HD 21 diesel powered torque converter drive crawler tractor. Marginal notes alongside the cut-away view point to many of the HD 21's mechanical, design and construction features.

SOILEST, INC., 4711 W. North Ave., Chicago 39, Ill., has issued a new bulletin which illustrates and describes specialized ovens, water baths and humidity chambers. These units are designed to be used in the field or laboratory for testing soils, concrete, asphalt and other construction materials in accordance with ASTM and AASHO specifications. Full visibility jar baths and metal water baths for laboratory use are illustrated. Other items include bituminous penetration devices and the standard rotating shelf asphalt oven.

GAR-WOOD INDUSTRIES, INC., customer service dept., Wayne, Mich. has prepared a new 24 pg. catalog featuring it 75 B series of ¾ yd. power excavators. The catalog contains detailed action photographs of power shovels, cranes, draglines and other optional excavator attachments. Important parts and assemblies of the 75B are pictured and described in detail.

"DICTOGRAPH," a special brochure released by Dictograph Products, Inc., 92-25 149th St., Jamaica 35, N. Y., describes a new product which gives instantaneous intercommunication between several persons at one time. The dictograph is stated to jump the switchboard-and-at the same time release the board from the burden of these calls, speeds up outgoing calls and offers complete privacy of conversation.

The Dictograph station unit carries a push button for every member of the linked group with each name listed beside it. Reception is by a loud speaker or hand set with some models permitting selection of either, as desired. Many variations and special features are described in this brochure.

A C INDUSTRIAL WELDERS, Publication GEC 1259C, 4 pages, illustrated, includes product features, specifications, power requirements, operating data and a list of optional features for General Electric A-C welders in 300, 400 and 500 ampere ratings. Available from General Electric Co., Schenectady 5, N. Y.

CLIPPER MFG. CO., Suite 250, 2800 Warwick, Kansas City 8, Mo., has made available two new brochures on their line of masonry saws. The features of Clipper's all new 2 hp Supermatic are described in brochure #2019, and the 1½ hp original Select-A-Notch masonry saws are pointed out in brochure 2021.

AIR ENTRAINING AGENT FOR CONCRETE —Catalog A.I.A. 3-B-L, A. C. Horn Co., Inc., 1010 44th Ave., Long Island City, N. Y. Describes "Ayr-Trap," a liquid solution of N-Tair sodium resinate that improves plasticity, cohesiveness and reduces tendancy to segregate or bleed.

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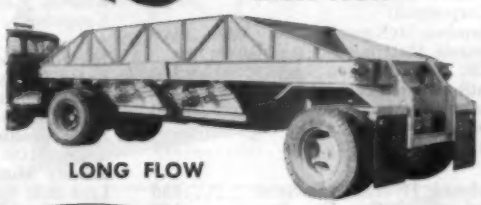

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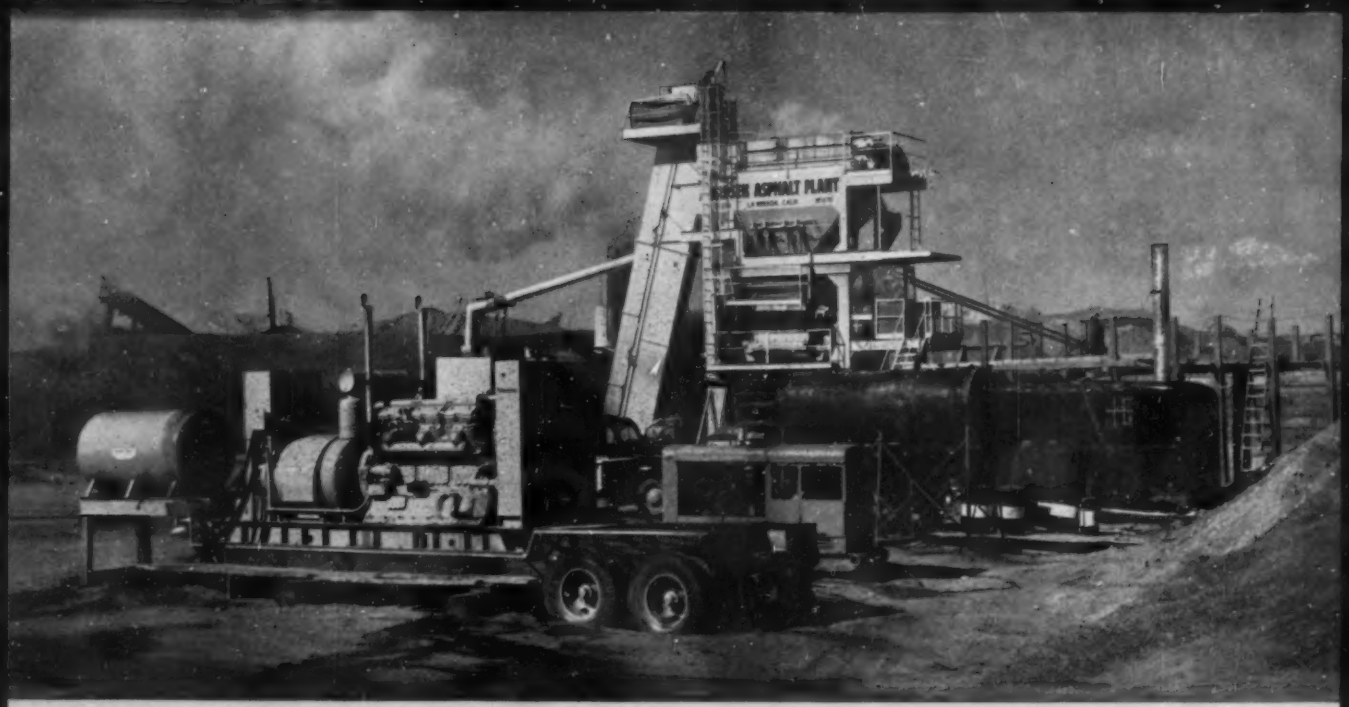

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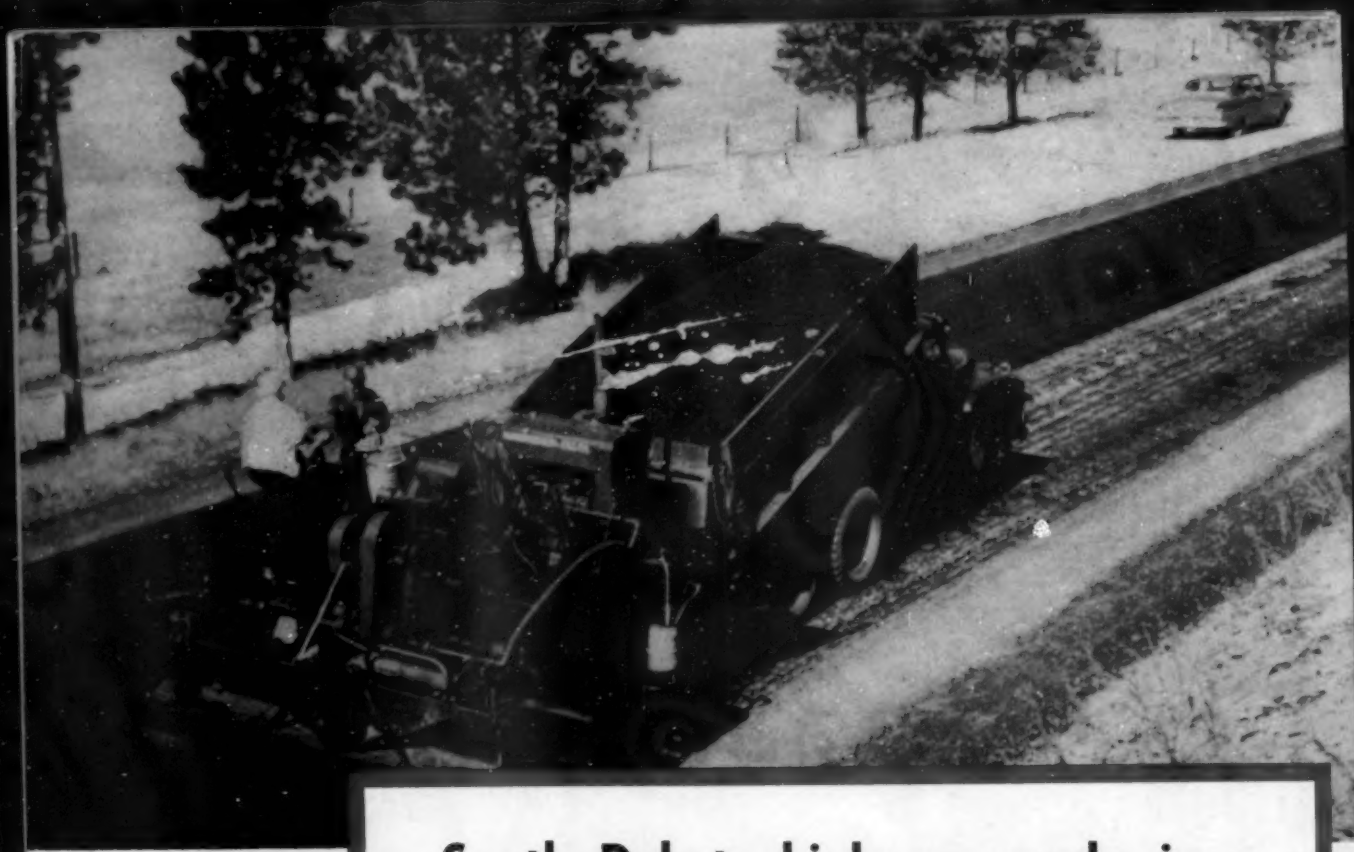

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